Engin. Library

EXCAVATING ENGINEER

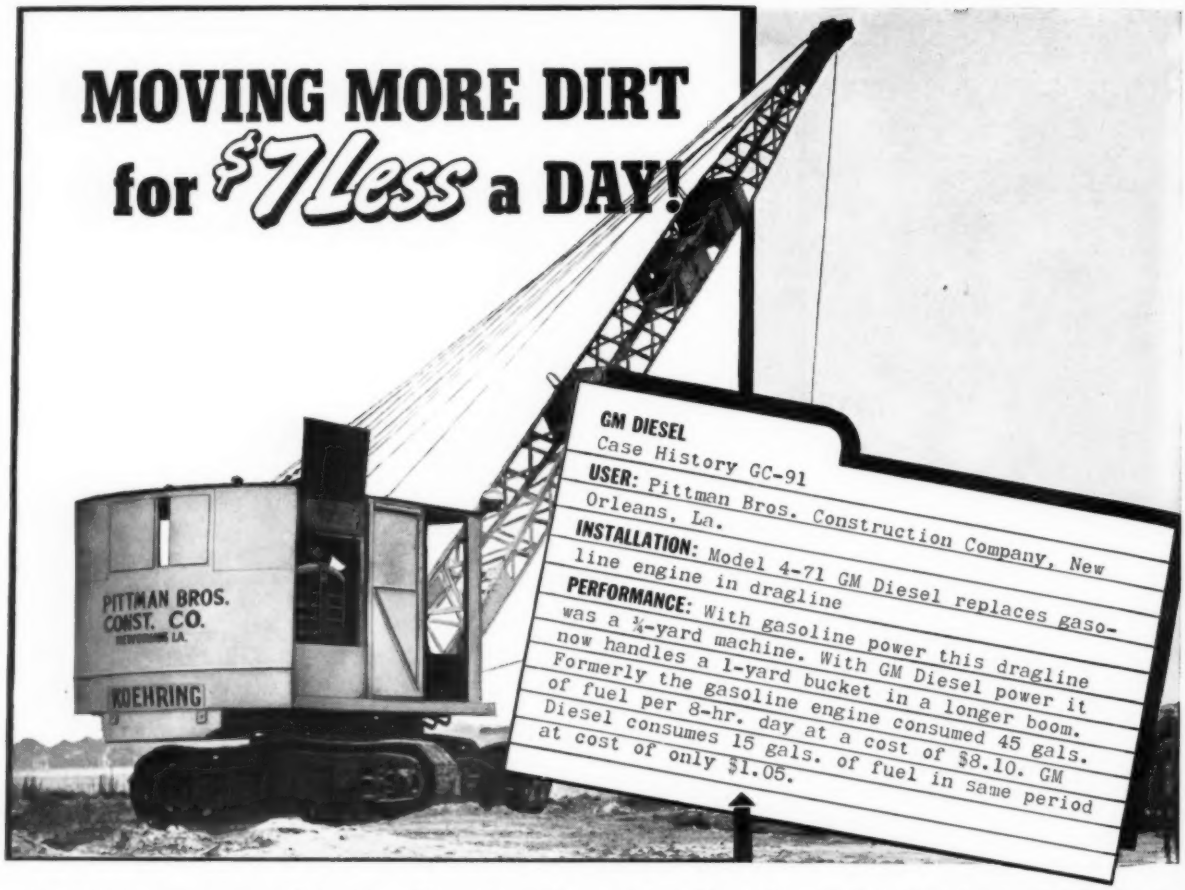
FOUNDED 1905

DRY PLACER MINING

See Article This Issue

Vol. XXXIV June, 1940 Number 6

MOVING MORE DIRT for $7 Less a DAY!


PITTMAN BROS.
CONST. CO.
KOEHRING
GM DIESEL
Case History GC-91
USER: Pittman Bros. Construction Company, New Orleans, La.
INSTALLATION: Model 4-71 GM Diesel replaces gasoline engine in dragline
PERFORMANCE: With gasoline power this dragline was a ¾-yard machine. With GM Diesel power it now handles a 1-yard bucket in a longer boom. Formerly the gasoline engine consumed 45 gals. of fuel per 8-hr. day at a cost of $8.10. GM Diesel consumes 15 gals. of fuel in same period at cost of only $1.05.

WHEN you move more dirt per hour, that's one way to make more money per job. To cut operating costs is another.

It used to be rare when you could do both at once. But not since the GM Diesel came to the aid of contractors!

And here's a typical case in point.

With its original gasoline engine, that dragline in the picture was a ¾-yard machine with a ¾-yard bucket on a 40-foot boom. Now that it's GM Diesel-powered, it has a 1¼-yard capacity with a 40-foot boom—or handles a 1-yard bucket on a 50-foot boom.

That's what we mean by moving more dirt. And this is how it does it for $7 less a day. The GM Diesel uses 30 fewer gallons of fuel per day—and, of course, a much cheaper fuel at that.

So you can see how *doubly* advantageous it was for Pittman Brothers to make the GM Diesel replacement they did.

But most important are the reasons why this Diesel can do a similar job for you in almost any sort of engineering or construction work—in portable, mobile and stationary applications of every sort.

The General Motors 2-cycle principle on which it's designed enables it to lug like a steam engine—yet respond to varying loads more quickly than even gasoline engines can. Hence, the ability to make more trips—move more dirt. Likewise, its simplicity and the interchangeability of its parts make it easier to service and maintain—a most important feature on isolated, out-of-the-way jobs.

Here are certainly a host of reasons for specifying GM Diesel power in any new equipment you may have in mind.

And if you'd like to know exactly how it can better performance and lower costs in any of your present rigs, just ask your nearby GM Diesel dealer for all the facts you need—or write:

GENERAL MOTORS DIESEL

GM GENERAL MOTORS DIESEL POWER

Dept. I-5-F

DIESEL ENGINE DIVISION

General Motors Sales Corporation
Cleveland, Ohio

SEE THE DIESEL EXHIBIT AT THE GENERAL MOTORS BUILDING IN THE 1940 NEW YORK WORLD'S FAIR

de-
am
ng
so-
oil-
ore
the
ke
—
ed,

ea-
sel
ou

tly
nd
ent
GM
ou

ON

FAIR

EXCAVATING ENGINEER

FOUNDED 1905

contents

Vol. XXXIV **June, 1940** No. 6

June Advertisers

American Chain & Cable Company .....3rd Cover
Atlas Imperial Diesel Engine Company 357
Bargain Counter 383
Buckeye Traction Ditcher Company 326-327
Bucyrus-Erie Company....361, 364, 366, 370-371, 379, 380, 384, 4th Cover
Bucyrus-Monighan Company .. 351
Caterpillar Tractor Company .. 347
Diesel Engine Division General Motors Sales Corporation .....2nd Cover
Differential Steel Car Co. 373
Ensign-Bickford Company, The. 328
For Sale Advertisements....381-382
General Motors Sales Corporation .....2nd Cover
Haiss Manufacturing Company, George 353
Hayward Company, The 384
Hercules Powder Company 322
Ingersoll-Rand Company 321
International Correspondence Schools 384
International Harvester Co. .. 329
Jaeger Machine Co., The 364
Koehring Company 359
Leschen & Sons Rope Co., A. .. 378
LeTourneau, Inc., R. G. 355
Macwhyte Company 349
Northwest Engineering Company 325
Owen Bucket Company 362
Roebling's Sons Co., John A. .. 324
Rogers Brothers Corporation .. 360
Sanford-Day Iron Works 365
Sauerman Bros. 358
Suckert Loose-Leaf Cover Co... 384
Socony-Vacuum Oil Company, Inc. 374-375
Standard Oil Company of California 345
Timken Roller Bearing Company, The 369
Wellman Engineering Company, The 356
Westinghouse Electric & Manufacturing Company ... 363

Civilization Comes to Coachella—By Floyd Suter Bixby.. 330

Morrison-Knudsen and M. H. Hasler cut a 47-mile section of the All-American Canal through the Coachella Valley desert.

Dry Placer Mining in New Mexico 334

Universal Placer Mining Corporation uses a Bucyrus-Erie 54-B dragline in unique "dry panning" operations of gold bearing dirt. (See Front Cover)

Pennsylvania Flood Control Job—By William R. Moody, Jr. 338

Groves-Lundin near the completion of their contract on an important unit of Pennsylvania's flood control program.

Editorials 342

Peace or War There'll Be Digging to Do 342
April Construction Figures. 343
Irrigation in Brazil 343

Equipment You Ought to Know About 344

Pipe Anticipator 344
Portable Quarry Plant 344
Model "99" Loader 344
Sinking Drill 344
General Utility Resistor ... 346
New Air Hose 346
Spray Line Marker 346
Reversible Wrenches 378
Boring Machine 378

Field Notes 348

Emergency Appendicitis Care 348
Small Die Grip 348
Haulage Contract Holds ...348
Screw-Staple Fastener 350
Gear Teeth Molds 350

Shots From the Firing Line 352

AGCA Opposes WPA 352
"Topping Out" at Ft. Peck 352
1940 Federal Aid Bill 354
Complete Fresno Dam 354
Connecticut Valley Dams .. 356
WPA Road Summary 358
Continental Divide Tunnel. 358
Erect Gila Power Line 360
North Dakota to Vote Diversion 362
Approve Nebraska Project.. 362
Dragline Salvages Boat's Cargo 364

Not in the Contract 368

Trade Notes 381

Book Reviews 381

Published Monthly by THE EXCAVATING ENGINEER PUBLISHING COMPANY, South Milwaukee, Wisconsin, U.S.A.

F. O. WYSE, *Manager* — ARNOLD ANDREWS, *Assistant Manager*
G. B. REED, JR., *Editor* — M. J. BARGENQUEST, *Associate Editor*
JOHN I. MORAVEC, *Art Director* — DELMAR COHEN, *Assistant Editor*
E. M. HEUSTON, *Sales Manager* — E. F. BRIESEMEISTER, *Assistant Editor*

CCA Member Controlled Circulation Audit

Regular subscription: 25 cents per copy, $2.50 a year; Canada, subject to publication policy, $3.50 per year. Special subscription: Upon application on card inserted in this number this publication will be sent frequently (not regularly) free of charge, to companies, executives and supervisors engaged actively in the industry of excavation.

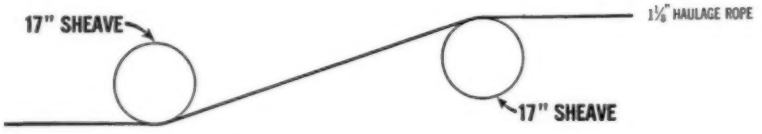
COPYRIGHT 1940 BY THE EXCAVATING ENGINEER PUBLISHING COMPANY

WHO SAID "Wire Rope Reeving Isn't Important"?

BEFORE

4" rollers at reverse bend. Rope service unsatisfactory.

AFTER



17" sheaves replaced the 4" rollers.

RESULT **Rope Service almost Doubled!**

This is an *actual* case history. Not an isolated case. But a typical example of what can be and is being done to increase rope life through proper wire rope reeving.

There is nothing complicated about proper wire rope reeving. It's simply a matter of watching the things that are easily overlooked—avoiding reverse bends whenever possible, making sure that sheaves are large enough, that sheave grooves are in proper condition, etc. The additional examples to the right are typical of what can be done. And they pay big in results.

To obtain maximum safety and service from wire rope—watch wire rope reeving. And feel free to consult our local representative—who will gladly make available to you our years of experience with every conceivable kind of reeving problem. His suggestions may point the way to worthwhile savings.

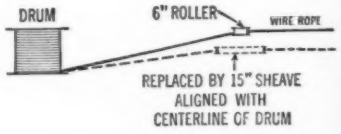
JOHN A. ROEBLING'S SONS CO.
Trenton, N. J. *Branches in Principal Cities*

This advertisement is published in the interest of all wire rope users, to help them obtain greater safety, service and efficiency from their wire rope.

ROEBLING

JAR Wire Rope

SOME OTHER "REEVING POINTERS" THAT INCREASE ROPE LIFE



These simple changes doubled rope life!

Originally, a 6-inch roller was used, as indicated above, in reeving a hoist. First of all, this roller was too small—causing a sharp bend in the wire rope. Secondly, it was improperly aligned—causing scrubbing action of the rope on the drum. As a result wire rope life suffered.

By simply replacing the 6-inch roller with a 15-inch sheave, and properly aligning this sheave, as shown, excessive rope wear was eliminated. Wire rope life was doubled!

Dragline sheaves replaced —rope life tripled!

An Illinois coal company replaced worn Fairlead sheaves with larger sheaves of harder material. Result—average service of five ropes almost tripled that of five ropes used before.

Ask about **ROEBLING "BLUE CENTER" WIRE ROPE** *. . . either standard or preformed*

See the New INTERNATIONAL DIESEL TracTracTors

HERE'S THE BIGGEST crawler-power news of 1940—International's 4 *New* DIESEL TracTracTors. We offer the big TD-18, the small TD-6, and the in-between sizes—TD-9 and TD-14 . . . *perfectly designed balanced power* to operate *balanced equipment* at a profit.

International Harvester has designed economy, performance, low upkeep, operator convenience, and long life into these powerful, versatile crawlers. Their handsome streamlined style shows what's on the surface. Under their hoods are International *full* Diesel engines, long famous for their quick, easy starting, outstanding economy, and lugging ability.

Every detail of TracTracTor design is perfectly coordinated with the power of the engine to turn out the most work per day at the lowest cost.

These *New* DIESEL TracTracTors have what it takes to make money for you. Ask the nearby International industrial power dealer or Company branch all about them.

INTERNATIONAL HARVESTER COMPANY
(INCORPORATED)
180 North Michigan Avenue Chicago, Illinois

Sold outside U.S.A. by International Harvester Affiliated Companies and Distributors. Cable Address: Harvester, Chicago

INTERNATIONAL
Industrial Power

EXCAVATING
ENGINEER
JUNE • 1940

CIVILIZATION comes to Coachella

Morrison-Knudsen and M. H. Hasler cut a 47-mile section of the All-American Canal through the Coachella Valley desert.

By FLOYD SUTER BIXBY

EUROPE MARCHES. The tramp of a million feet crushes the verdure of her civilization. Hellish thunder, breaking from the skies, destroys the culture of other years. Nations sweat and bleed and groan to become mistress of the seas. Their dictators say all this is done to "civilize" Europe's last frontiers.

This is not the American way.

The American scheme of things is being carried out in the development of one of her last untouched frontiers, the Coachella Valley of Southern California. The tramp of marching feet here has no war-like meaning. It is only a group of surveyors. The thunder coming from yonder sky is only the full-throated roar of the diesel-powered Bucyrus-Monighan as it eats a 47 mile canal through the arid desert, drooling sand over the levee spoil banks in its wake. While Europe's nations fight for mastery of the seas, these American pioneers sweat only for the 1500 second feet of clear Colorado River water which they know will flow through the canal they are building—a canal that will make the desert bloom, and will develop the potential resources of the Coachella Valley to bud a green and living thing. It will feed the ever-growing Los Angeles metropolitan area. That is the American way of bringing civilization to her frontiers.

Coachella Branch Last Step

The 47 mile stretch of the Coachella branch of the All-American Canal* being built by Morrison-Knudsen and M. H. Hasler of Los Angeles for the United States Bureau of Reclamation marks the last great step toward the ultimate development of the eastern desert of the Imperial Valley, the lower reaches of the Coachella Valley desert, and the lands lying northward above the Salton Sea.

This has been the dream for years of men who lived far ahead of their times. Dr. Oliver M. Wozencraft, a young San Francisco doctor, and Ebenezer Hadley, county surveyor of San Diego County, foresaw the tremendous possibilities of the development of the whole eastern valley of Southern California as early as the Civil War. On down through the crimson stained days of the roaring eighties the names of A. H. Heber and Charles Robinson Rockwood, who took up the reins where death and death alone forced Dr. Wozencraft to lay them down, stand out in this living chronicle of a nation's tribute to a worthwhile job well done.

The story of the development of the Southern California desert wastes becomes ultimately a story of a successful battle. Water first reached the lower part of the Imperial Valley lying below the Coachella Valley as early as 1901. Private enterprise directed this water into the valley through a privately built canal which followed natural drainage lines through northern Mexico and back into California at Calexico, finally draining northward into the Salton Sink, and coming to rest in the ancient low spot 276 feet below the level of the sea.

The idea of bringing Colorado River water to this arid waste by means of a canal entirely within the United States has been considered for a number of years. In 1876 the Corps of Engineers of the United States Army made a topographical survey, reporting unfavorably on the feasibility of the project. The development of the lower part of the valley was done through the Mexican canal until 1935, when work was finally started by the U. S. Bureau of Reclamation on one of the most difficult irrigation engineering feats

*For companion article on the Imperial Valley branch of the All-American Canal see Excavating Engineer, March, 1940.

● Left: The Bucyrus-Monighan dumps a 12-yard load of sand on the levee top, while a Caterpillar-mounted bulldozer grades the canal bottom.

● Above: Superintendent Partain (right) talks it over with Charles Bradley, company engineer. Below: Barren and desolate, this land is typical of the area to be reclaimed by this branch of the All-American canal.

● Above: Life giving water from the Coachella canal will make possible date gardens of this type. Below: Looking at the canal excavation from the top of the Monighan's 165-foot boom.

● A 1½-yard Marion excavates for one of the siphon structures while a Caterpillar-LeTourneau unit keeps loose sand within dragline reach.

up to that time — the construction of the All-American Canal.

When the southern section of the All-American Canal was almost completed to the western limits of irrigation, the northward arm of the canal system known as the Coachella Valley branch was authorized. This part of the canal flows northerly along the west limit of Eastside Mesa to a point near the upper reaches of the Salton Sea. A $2,370,000 contract with the Morrison-Knudsen Company and M. H. Hasler, of Los Angeles, California, was awarded in June, 1939, by the Bureau of Reclamation for the construction of the main canal and appurtenant structures between station 2078/16 and station 4563/37. These stations are referred to the original take-off from the All-American Canal near the international boundary.

● Lorain 40 truck crane is employed by C. M. Hill, subcontractor, to unload steel reinforcement rods in the yard at Niland, California.

The Bureau of Reclamation will allow 1060 calendar days for the completion of work under the contract, which includes the construction of 47 miles of main canal totaling 13,000,000 cubic yards of excavation, the construction of 32 concrete siphon structures, 4 automatic spillways, 1 check and 5 drainage inlets.

Making up the bulk of the job, in addition to the 13,000,000 cubic yards of canal excavation, are 55,795 estimated yards of uncompacted backfill; 63,350 yards of compacted backfill; 425,601 yards of structural excavation around the concrete siphon structures; 848,000 yards of excavation for diversion channels; 17,737 yards of Class A structural concrete; 14,097 yards of Class A siphon barrel concrete; and 11,834 cubic yards of Class A concrete in the floor slabs and paving. About 6,876,200 pounds of steel reinforcement will be placed in the concrete forms; and 112,500 pounds of structural steel in the radial gates of the automatic spillways; 108,600 pounds of radial gate hoists; 1,431,171 pounds of steel sheet piling; 5 engine houses for operating radial gate hoists; 47,670 linear feet of 6″ cast iron pipe drains and 125,420 cubic yards of stone riprap complete the quantities of the job.

There is but a gradual fall to the canal system on the Morrison-Knudsen job. At station 2070/00, near the beginning of the job, the canal floor grade is 92.87 feet above sea level. During the next 47 miles to station 4570/00, near the other end of the job, the elevation of the canal floor grade drops to 45.47 feet above sea level, or roughly a drop of one foot to the mile of canal. This according to Bureau of Reclamation engineers, is quite ample to allow the normal flow of 1500 second feet of water to work through the canal and siphon structures.

● Superintendent Partain's special steel wall forms are removed from a siphon structure pour by a Mack-mounted Bay City crane.

● Erection of a structural steel bridge over the All-American canal is handled by a Bucyrus-Erie 45-B dragline.

In a similar manner, the size of the canal diminishes from the upper to the lower reaches of the job. At station 2078/16, which is the point of the job nearest to the Colorado River, the canal has a 46 foot bottom, 2:1 side slopes, and is 9.25 feet deep from the average original ground surface. At station 4563/37, the other end of the project, the canal is reduced in size to a 40 foot bottom, 2:1 side slope and a depth of only 8.34 feet below the original ground surface. Material excavated from the canal is used to build a uniform levee with a crown 24 feet wide on both sides of the canal throughout its length.

Before any work was done on the main job, a construction road was built from the company headquarters at Frink to both ends of the job, with branches to the quarry site and other work points. After the road was bladed in with a Caterpillar D7 bulldozer a macadamized surface was placed. This road is so heavily travelled with job cars, batch trucks and rock trucks that the company has hired its own policemen to patrol the road and hold traffic speeds down.

Draglines Handle Excavation

Excavation for the canal is done under the supervision of excavation superintendent C. A. Colon, who uses a 12-yard bucket of his own design on a 6150 Bucyrus-Monighan machine. This machine, equipped with a 160 foot boom, moves an average of 11,000 yards of earth per 24-hour day. The Monighan, powered with a 6 cylinder Fairbanks - Morse diesel motor, uses 350 gallons of fuel to excavate its daily output. A crew of three men is used to clear sagebrush and cactus away from the canal location so that the Monighan can have a clear road to work. This is the only clearing on the project. The fact that the brush is scattered is borne out by the fact that three men easily clean 1000 feet of right-of-way per 8 hour shift.

To handle and dispose of 11,000 yards of material per day the Monighan must necessarily leave the banks of the canal rough. A Bucyrus-Erie 37-B dragline is used with a Caterpillar 80 bulldozer to dress the final shape of the slope and top levees. The 37-B handles 1100 yards of material in 24 hours in cutting and dressing the slopes. About 75 gallons of fuel is used per 24 hour day. It keeps this combination hopping to keep up with the ponderous, grumbling Monighan a thousand feet ahead as it eats away for a while and then walks backward two or three steps on its massive feet to gorge again.

The material in the Morrison-Knudsen job is more compact than

(*Continued on page 372*)

● Siphon structure No. 9 ready for an invert pour. Bucyrus-Erie 50-B in the background dug the structural excavation.

● Marion 1½-yard shovel loads out quarry stone for canal riprap work on a subcontract held by R. Newton McDowell.

Universal Placer Mining Corporation develops a high-frequency-vibration, low-pressure-air method which proves highly successful in "dry panning" gold.

THE phrase "dry placer mining" may sound a bit incongruous, but that's exactly the operation performed by the Universal Placer Mining Corporation in New Mexico and California gold bearing areas. Using their unique dry method, this corporation has just completed its gold recovery operations in an area about thirty miles from Santa Fe, New Mexico.

During this operation the company investigated other placer deposits and on May 1, 1940, announced their intention to move their plant to a proven placer area near Randsburg, California.

Thorough and intensive study and experimentation lie behind this dry placer method, believed to be the only successful one in existence. A recent Excavating Engineer field trip to the New Mexico operations uncovered some interesting data on this method.

Moving In the Equipment

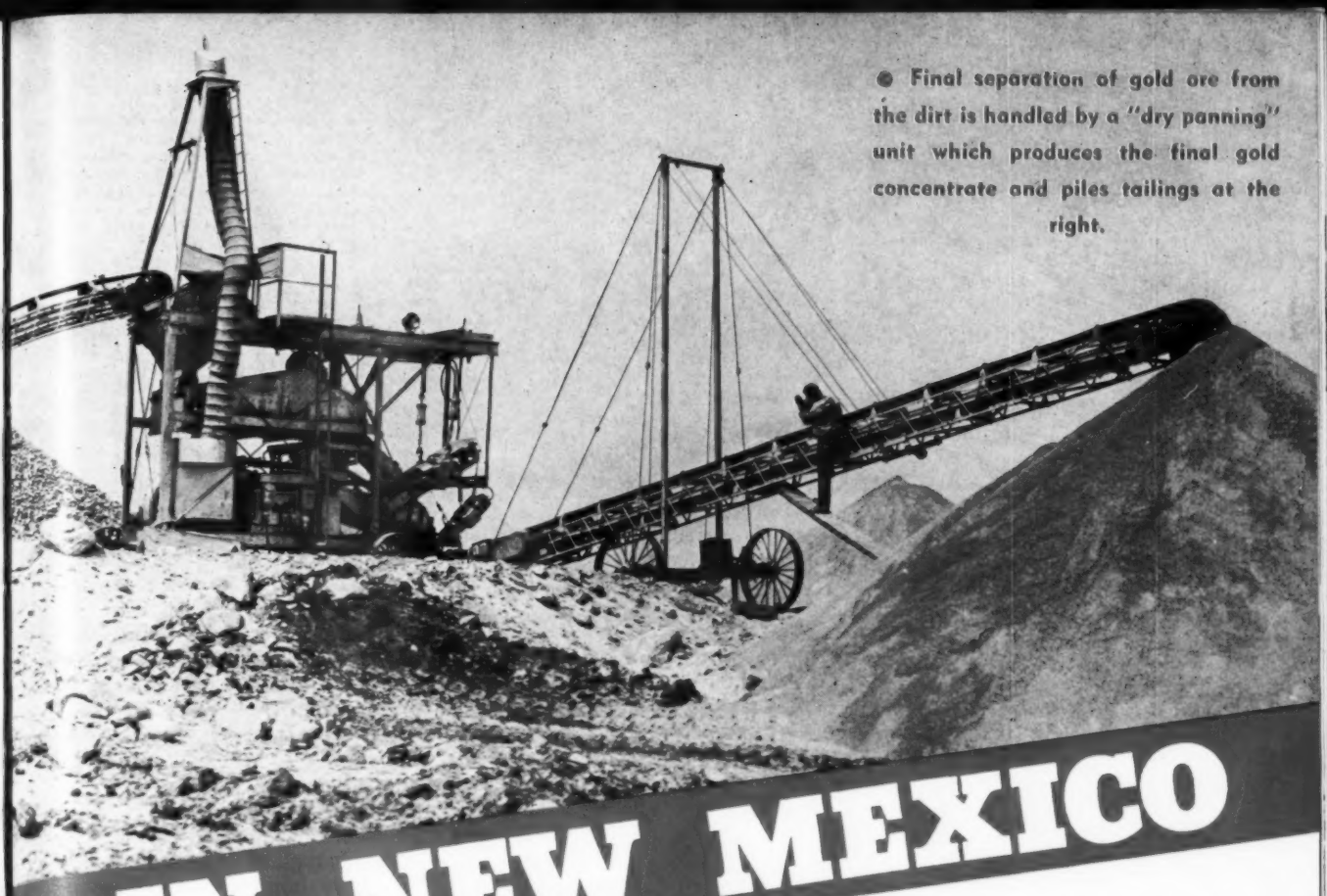
Universal Placer's first problem in the New Mexico area proved to be a relic of the early gold rush days. Old time hard-pan prospectors had left the ground too pitted for equipment to move over it. The first job, therefore, was filling in and leveling off the surface with a LeTourneau bulldozer mounted on a Caterpillar D7 tractor.

First excavating unit on the job was a Northwest No. 5 dragline, which swung a heavy-duty 1-yard Esco bucket. Larger loading capacity was needed and, in December 1939, a Bucyrus-Erie 54-B with 1¾-yard Red Arch bucket was moved in. Approximately 330,000 cubic yards of pay dirt have been handled on this property.

Briefly summarized, the plant now in use includes, in addition to the 54-B dragline: a 3-unit "washing" plant, electric power unit, and amalgamating mills. The latter were located in Santa Fe, at the company's offices in Sena Plaza.

Material, weighing from 3500 to 3800 pounds per cubic yard, is dumped on an elevated grizzly by the dragline, which is equipped with a 90-foot boom. The average hourly output with the heavy-duty 1¾-yard bucket (100-125 yds. per hour) is regulated by the capacity of grizzly and disintegrator unit. With a maximum digging depth of 30 feet, and with the top of the grizzly about 15 feet above ground surface, the ability of the dragline to hoist and swing simultaneously at full speed is especially valuable, according to Superintendent McCrae.

The grizzly, set at an angle of about 35 degrees to reject rock, has an 8-foot opening each way. Bars are 110-pound rail, set 8 inches apart. The plus 8-inch material is bulldozed into worked-over areas by the Caterpillar-LeTourneau unit. Material which passes through the grizzly is classified to minus 1-inch by a revolving trommel. Oversize is wasted by a 60-foot Barber-Greene conveyor with a 24-inch belt. About 50 per cent of the material excavated is plus 1-inch,



● Final separation of gold ore from the dirt is handled by a "dry panning" unit which produces the final gold concentrate and piles tailings at the right.

IN NEW MEXICO

and is wasted. So far, the material has been handled by Unit No. 3. It next goes by belt conveyor to a bin in Unit No. 2, from which it is fed to the disintegrator.

This unit is one of the key points in the success of this dry placer method. What it does is best described in the words of J. H. Kennedy, Universal Placer president. He says: "It gives intimate percussive impact on a large mass of material at low cost, without grinding." Pin liners on this disintegrator are reversible. They give about 70,000 yards service, each side, and then are replaced.

"Dry Panning" the Ore

When the material has been broken down into its basic forms here, it goes via an 18-inch Barber-Greene conveyor to Unit No. 1. Here, it first passes over a low head Allis-Chalmers vibrating screen which separates it into plus and minus ¼-inch. Both classes are treated by high-frequency (3600 per minute)—low pressure air vibration. The plus ¼-inch material goes to a nugget trap; the minus ¼-inch over a set of tables, equipped with Jeffrey vibrators. The combination of vibration and air pressure serves to keep the lighter material in suspension (just as water does in wet placer mining), while the gold and heavier ores fall into flutes, or pockets. Riffles on wet placer tables are raised; these flutes, performing the same function, are dropped below the level of the table. The lighter, rejected material is carried from tables and nugget trap to the tailing pile by a 55-foot, 18-inch Barber-Greene conveyor. Waste material from both No. 1 and No. 3 units is conveyed to ground already mined.

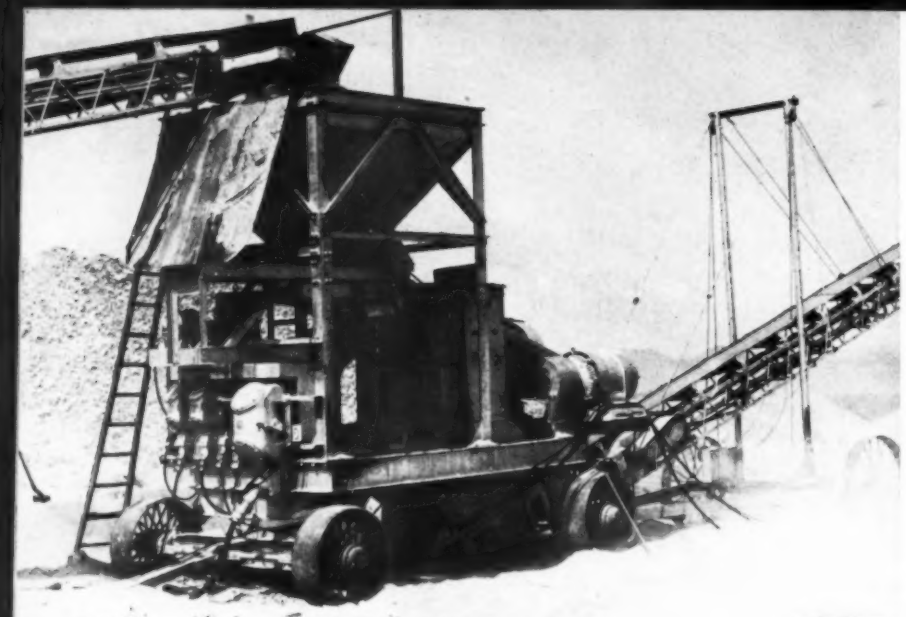
Side traps and a small Jeffrey reconcentrator drain the concentrates off at No. 1 unit without requiring the machinery to be shut off. Concentrates are taken into the office at the end of each shift. From seven to eight quarts is the average concentrate output per 7½-hour shift. It is necessary to handle about 30,000 yards of virgin gravel to get 1 yard of concentrates. At the office, concentrates are run through two 12-inch Denver Bowl ball mills hooked in tandem. In these, the gold is amalgamated with mercury. Other ores are discarded, the mercury burned off and reclaimed, and the flaky-looking gold shipped off to the mint.

All Units Mobile

All three units of the plant are wheel-mounted. They are moved from 70 to 80 feet every six to nine shifts, with the tractor doing the hauling. A move requires from 1½ hours to 2 hours. A "band" from 90 to 100 feet wide is excavated at each "station." The three units weigh about 12, 8, and 7 tons, "reading" from 3 to 1.

Operations at the mine are on a three-shift-per-day basis, each shift running 7 hours. Five men handle each shift—dragline operator, tractor operator, concentrating man (also shift foreman), screen and disintegrator operator, and power plant operator.

The diesel-electric power plant is composed of a 180 h.p. Western engine and a 55KVA generator.



● Top: Unit No. 2 in the placer set-up is this disintegrator which breaks the gold bearing material down into its basic forms. Bottom: Eight inch material, rejected by the grizzly, is bulldozed into worked-over areas by a Caterpillar-LeTourneau combination.

from 5 to 40 h.p. are used. The disintegrator is run by a 40 h.p. motor; the blower by a 15 h.p. motor. About 90 h.p. is required to run the entire plant.

The 54-B dragline is powered by a 207 h.p. Buda-Lanova diesel engine. It (as well as the Caterpillar tractor and power plant) uses 32T diesel fuel, R.P.M. Delo lubricating oil, and Texaco greases. The 54-B has used an average of 3 to 4 gallons of fuel per hour. The machine is fueled once, during the day shift, for 24 hours operation. The bottom of the fuel tank is drained at the end of each shift to keep fuel clean. The tractor has averaged 2½ to 3 gallons of fuel per hour; and the power plant, which is under constant load, about 6. Oil in the dragline and in the power plant is changed every 55 to 60 hours; in the tractor, every 48 hours.

Constant Greasing Operations

The dragline is greased every four hours (at the noon period of each shift). Machinery is greased as needed during operation. The man in charge of the grizzly handles this job for units 2 and 3, and the concentrate man takes care of unit No. 1. The tractor operator handles greasing for that unit and for the dragline. Preformed wire rope is standard, Roebling cable being used for the

Power is taken from this plant to the No. 2 Unit via 1000 feet of General Electric Tellurium cable. Five hundred feet of this is 2-inch, and 500 feet 3-inch cable. This gives a working area of 1000 feet on each side of the power plant. This conductor cable has made a hit with everyone in the organization as it has proved a real time and money saver. A main switch at No. 2 Unit, and switches at Nos. 1 and 3 control the current distribution. One-inch cable (3-conductor, 259 strand) carries the power from No. 2 Unit to the various individual motors which run belts, feeders, blower, and tables. Allis-Chalmers motors,

● James McCrae, assistant secretary of the corporation and general superintendent of operations, watches his operator work the dragline.

● Source of power for the 3-unit placer operation is this diesel-electric power plant. At the left are diesel fuel tanks.

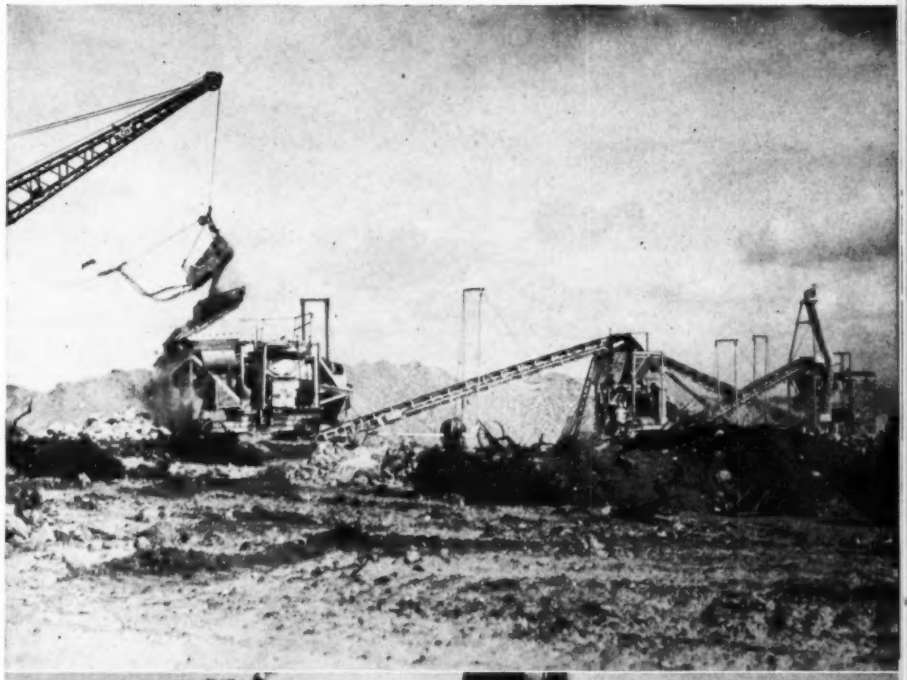
54-B hoist and boom suspension, and Edwards cable for the drag rope. H. & L. self-sharpening teeth are used with the Red Arch bucket, and have an average life in this tough material of six to eight shifts. A 1500-Watt Kohler light plant on the dragline, and other lights direct-connected to the power plant furnish illumination for the night work.

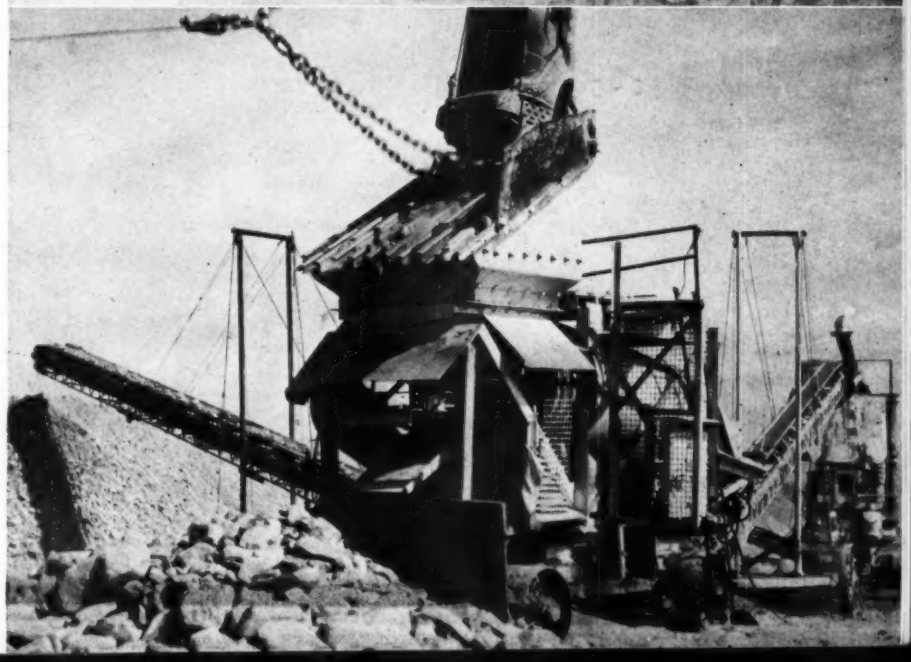
Men Behind the Operations

J. H. Kennedy is president of Universal Placer Mining Corporation. Wm. Colhoun is secretary-treasurer, and James McCrae assistant secretary and general superintendent. M. Wentworth is general foreman, Earl Downing is in charge of the second shift, and John Wallace commands the "graveyard" shift.

In spite of the success already achieved by this dry placer method, Mr. Kennedy points out that they are still considering it in the laboratory stage. A year and a half of testing and investigation preceded the building of any machinery. The four properties so far worked are regarded as practical tests. The results of both theory and practice are recorded in the company "bible"—an extensive volume of curves, formulas and records which contains the answer to any dry placer problem so far encountered. One indication that the plant is still not considered as having achieved its ultimate stage is the selection of a dragline with more digging capacity than is actually required at present. Eventually, Universal Placers expects to enlarge grizzly and disintegrator so a 2½-yard bucket can be used on the digging unit. Another future possibility is the use of this method and equipment for the recovery of other marketable ores found in conjunction with the placer gold.

At present, however, Universal Placer Mining Corporation is quietly going ahead and doing what many mining men have said couldn't be done—efficiently recovering free placer gold by a dry method.





● Top: General view of the "dry placer" operations, showing the three units that separate gold ore from the waste material. Bottom: Close-up of the grizzly and revolving trommel unit which starts the pay dirt on its journey.

PENNSYLVANIA
Flood Control Job

Groves-Lundin near the completion of their contract on an important unit of Pennsylvania's flood control program.

By WILLIAM R. MOODY, JR.

TIONESTA DAM is an important unit in the reservoir system plan of ten dams to be constructed along the Allegheny-Monongahela river basin for the protection of Pittsburgh and the reduction of flood heights in the Upper Ohio valley. This plan, designed to control flood waters at or near their source, was proposed by the Pittsburgh Flood Control Authority and adopted following the never-to-be-forgotten Saint Patrick's Day flood of March, 1936. Construction of the ten-dam system was authorized by Congress in the Flood Control Act of June 22, 1936. Subsequent legislation authorized the entire cost to be borne by the Federal Government.

Total estimated cost of the U. S. Army engineered and supervised Tionesta project is $5,900,000, of which, approximately $4,285,000 is for the dam and appurtenances, with the balance of $1,615,000 set aside for the purchase of land, relocation of highways, etc.

The dam, an earth fill type structure, is located in Forest County, Pennsylvania, on Tionesta creek, a tributary of the Allegheny river, and about 116 miles northeast of Pittsburgh, Pennsylvania.

Situated On Ideal Site

A natural peninsula formed by a hair-pin turn of Tionesta creek provided an ideal location for the dam as can be seen in the accompanying sketch. In general the hills are steep and the country is rugged, but there are broad rolling lands in which hills and deep dissection are absent. Tionesta creek valley at the dam embankment has a bottom width of 400 feet. The

● Top: Bucyrus-Erie 43-B at work on the spillway excavation. Bottom: General view of diversion tunnel outlet channel and stilling basin. (U. S. Army Engineer Photos)

● Top: Tionesta's diversion tunnel intake control tower is 140 feet high and is equipped with vertical, 17-ton lift gates. Bottom: View of the 9-foot diversion tunnel's interior. (U. S. Army Engineer Photos)

stream occupies the left side of the valley and is separated from the east abutment by a flood plain about 250 feet in width. The east abutment is formed by a broad stream-ward sloping rock-cut terrace. Back of this terrace and separated from it by a low hill, the land rolls into a broad saddle providing a favorable site for a spillway.

The west abutment is formed by a steep ridge, which rises from the water's edge to an elevation well above the top of the dam. A deep fill covers the valley floor, varying from a depth of 20 feet in the stream channel to a maximum depth of 45 feet on the right bank. Abutment rocks are deeply weathered and suitable earth and rock materials are present in the immediate vicinity for construction purposes.

The Tionesta project consists of the following three main features: the dam itself, consisting of a rolled earth embankment; outlet works located well around the bend and upstream from the dam, discharging into the natural stream about 650 feet below the downstream toe; and a saddle spillway, the entrance of which is some 2,000 feet upstream from the intake.

Contract for the construction of Tionesta dam was awarded S. J. Groves & Sons Company and Lundin Brothers on March 14, 1938. These two main contracting firms are known officially as Groves-Lundin, with home offices located at Minneapolis and Mankato, Minnesota. S. J. Groves & Sons Co., is represented on the job by Ernest J. Cox, vice-president and chief engineer. The Lundin Brothers are represented by Adolph Lundin, one of the partners. A. R. Lundin is superintendent in charge of excavation.

Groves-Lundin are no newcomers to dam construction work as they have been contractors on large dams in Western, New England, and Middle Atlantic states. Total amount of money involved in their present contract is $2,624,640 with a time allotment of 1,096 days.

Total Yardage of Excavation

Scheduled to be completed on May 2, 1941, the Tionesta project calls for the following excavation: 1,150,000 cubic yards of common excavation; 450,000 cubic yards of rock excavation; and 900,000 cubic yards in the borrow areas.

Time, as always, is a great factor in any undertaking and the Tionesta job is no exception. Although the outlet works and the spillway channel will soon be completed, contractor Adolph Lundin stated that he would "double up on work if necessary to compete with any unforeseen development." However, this, apparently will not be necessary.

Already, the area to be occupied

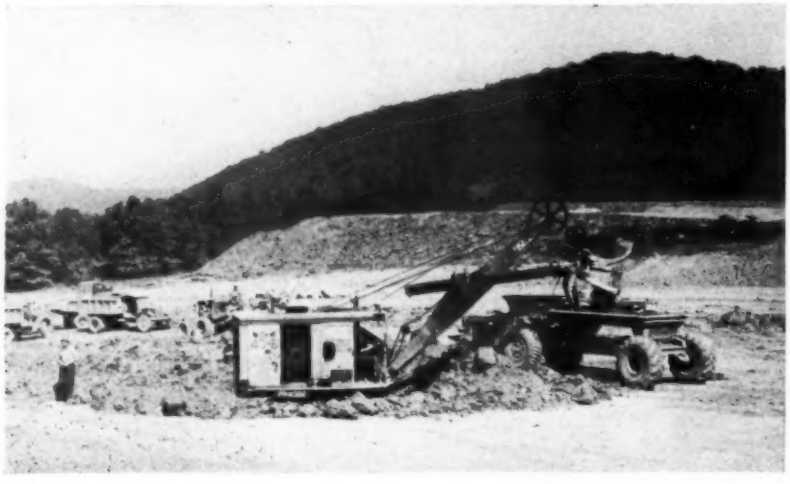
● Lorain 77 loads to a Euclid Trac-Truk in the spillway excavation. In the background a Northwest digs into a rock cut. (U. S. Army Engineer Photo)

by the embankment has been cleared and stripped to a depth of six inches by two Caterpillar diesel tractors equipped with LeTourneau bulldozers.

The embankment proper will be 154 feet high, 1050 feet long, and 29 feet higher than the spillway crest. The rock underneath has been thoroughly grouted to guard against underseepage. The grouted zone in the valley floor penetrates 30 feet into solid rock. To accomplish this a cut off trench was excavated to bed rock along the axis of the dam by a Northwest dragline equipped with a 2½-yard bucket swinging from an 80-foot boom. A 2-yard Bucyrus-Erie shovel and a 1½-yard Lorain shovel assisted in this operation.

Two million cubic yards of earth and rock fill are to be placed in the embankment. In cross section the dam will consist of various types of material, the center being rolled impervious matter, the intermediate sections on either side being rolled random material, and the outer sections pervious material. The upstream face will be covered with a heavy blanket of rock to prevent erosion and sloughing. Half of the fill used for the main structure will come from the spillway channel and the remainder from four major borrow areas. A fleet of 40 trucks, consisting largely of Mack, White, Euclids, and Auto Cars, ranging from 5 to 13 yards in capacity, are being employed to haul earth and rock.

● The 2-yard Bucyrus-Erie loads to a Euclid Trac-Truk during spillway excavation operations.



Spillway Excavation Operations

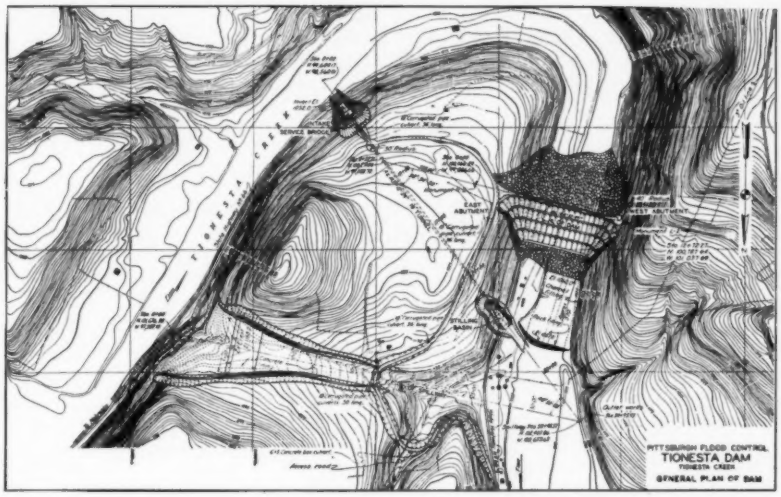
Spillway excavation is being handled by a 2½-yard Northwest and a 2-yard Bucyrus-Erie working two eight hour shifts per day. About 10,000 yards per day is being moved by this combination. Major hauling equipment on the spillway excavation consisted of a group of nine Euclids, four of these were diesel powered and of 13-yard capacity. The remaining five carried eight yards and were gas powered.

Two Caterpillar tractors, one towing a sheepsfoot roller, the other equipped with a LeTourneau bulldozer, were used in fill compaction operations. Two Ford sprinkler trucks kept the fill moist and also held down the dust on the hauling roads.

Tunnel and concrete work were undertaken by the following subcontractors: Sullivan Machinery Company, core drillers; Haliburton Oil Well Cementing Co., grouting contractors; George Carlstrom Company and B. M. Stark, concrete work; and Murphy-Richman Incorporated, tunnel work.

Before actual construction of the dam could be started it was necessary to complete the outlet works. These consisted of a diversion tunnel, concrete inlet structure, stilling basin, and the outlet proper.

The approach area to the diversion tunnel was stripped of timber and top soil by a crew of 85 workers and the Bucyrus-Erie shovel equipped with a 2-yard dipper.



● Sketch of the Tionesta project, showing the relationship of the intake tower, diversion tunnel, stilling basin, and the dam proper.

Then, Hercules, Atlas, and Du Pont blasting supplies were used to cut an approach channel in the hill of solid rock. Bores were made by Ingersoll-Rand rock drills powered by a portable, vertical type Gardner-Denver compressor.

Rock excavated from the approach channel was transported in heavy-duty dump trucks and used as fill for the coffer dam. Some of this rock was also used as part of the upstream toe of the main structure. The finished approach channel measured about 200 feet overall and had a maximum width at the bottom of 69 feet 6 inches. The bottom and sides of the channel are protected from erosion by a rock paving 2½ feet thick.

A circular bore 19 feet in diameter and 1875 feet in length, stretching from the upstream intake to the downstream stilling basin, was the problem which confronted tunnel contractors Murphy-Richman, before work on the main structure could commence. They encountered little difficulty however.

Drilling Diversion Tunnel

Steady and efficient drilling power was provided by a battery of 6 Model 315, double stage, heavy duty portable Ingersoll-Rand compressors. A 6-inch conduit pipe ran from the compressors to the tunnel where it was tapped by a score of Ingersoll-Rand and Cleveland rock drills. Connections were made by Chicago Pneumatic air hose and couplings. The battery of compressors was held at a 135 pound pressure which afforded plenty of steady and efficient power for the drills. This efficient combination of fast drilling and high powered explosives sent the 19 foot tunnel through the rock hill in jig time.

Shale and rock spoil from the tunnel bore was loaded on a pair of General Electric mine locomotives and transported for fill to the downstream toe. About 34,000 cubic yards were moved in the excavation of this diversion tube.

Upon completion, the tunnel bore was reinforced with steel ribs, thoroughly grouted, and lined with concrete 2 feet, 3 inches thick using about 16,000 cubic yards of concrete.

Another unit of the outlet works is the stilling basin which is 185 feet in length, 84 feet in width, with an area extending 85 feet below the outlet of the tunnel lined with reinforced concrete. Earth and rock excavated from the stilling basin was transported in a fleet of six 5-yard dump trucks to the site of the downstream toe and temporary coffer dam.

Lining the bottom of the deep stilling basin with concrete offered an interesting problem. Trucks could, with great difficulty back down the 120 foot incline and discharge their loads of concrete, but the time spent in backing, climbing, and turning in the soft mud would be detrimental to economy as well as safety.

George Carlstrom, sub-contrac-

(*Continued on page 377*)

● Dump wagon, 'dozer, sheepsfoot rollers, and sprinkling truck in action placing fill on the upstream side of Tionesta dam. (U. S. Army Engineer Photo)

EXCAVATING ENGINEER

FOUNDED 1905

A Monthly Publication

Devoted to the Excavating Industry

The Excavating Engineer Publishing Co.
South Milwaukee, Wisconsin

F. O. WYSE, *Manager* — ARNOLD ANDREWS, *Assistant Manager*

D. B. REED, JR., *Editor* — M. J. BARGENQUEST, *Associate Editor*

JOHN I. MORAVEC, *Art Director* — DELMAR COHEN, *Assistant Editor*

E. M. HEUSTON, *Sales Manager* — E. F. BRIESEMEISTER, *Assistant Editor*

Peace or War There'll Be Digging to Do

Peace or war, there will be digging to do in this country. Among the many uncertainties confronting the excavating industry today, this remains a solid certainty. Whether the future course of our government in World War II is belligerency or neutrality the equipment of the dirt moving contractor will not stand idle.

If we remain at peace which we all fervently hope will be possible, the American dirt moving contractor has a large job ahead of him.

A safe peace means strong preparedness measures. President Roosevelt's recent dramatic warning of the implications in Europe's "incredibly swift and deadly" blitzkrieg warfare has done much to make the American people defense conscious.

By the time this is published, the president's plea for $1,182,000,000 in additional defense funds will probably have been granted by Congress. Many dollars of this huge sum are earmarked for military construction purposes. Expansion of our army, navy, and aviation units will require a great amount of varied excavation and construction activities.

Increased military preparedness is closely dependent on an adequate system of high speed highways. In a land as broad as ours, ample highway facilities are of paramount importance in moving troops and materials. The country looks to the American road builder for the solution of this problem.

As long as Uncle Sam remains neutral he will be the world's No. 1 storekeeper. Exports of manufactured articles, raw materials and foodstuffs are showing a steady gain. Both North and South America are being called upon to furnish more and more of the materials needed by countries who have turned their productive facilities to the business of destruction.

Europe's demand for metals, coal, and oil will give added impetus to the mining industry. Quarries, and sand and gravel plants will also feel increased demand for their products for use in highway and construction work.

The present world conflict will accentuate an already rising industrial building program. New factories and plant additions will be built to produce a greater amount of the materials of war. All this building, of course, requires the excavating contractor's services.

War manufacturers, remembering their experiences at the close of World War I, are programming this increasing industrial growth as soundly as possible to avoid a repetition of the last war's "boom" and resulting "bust."

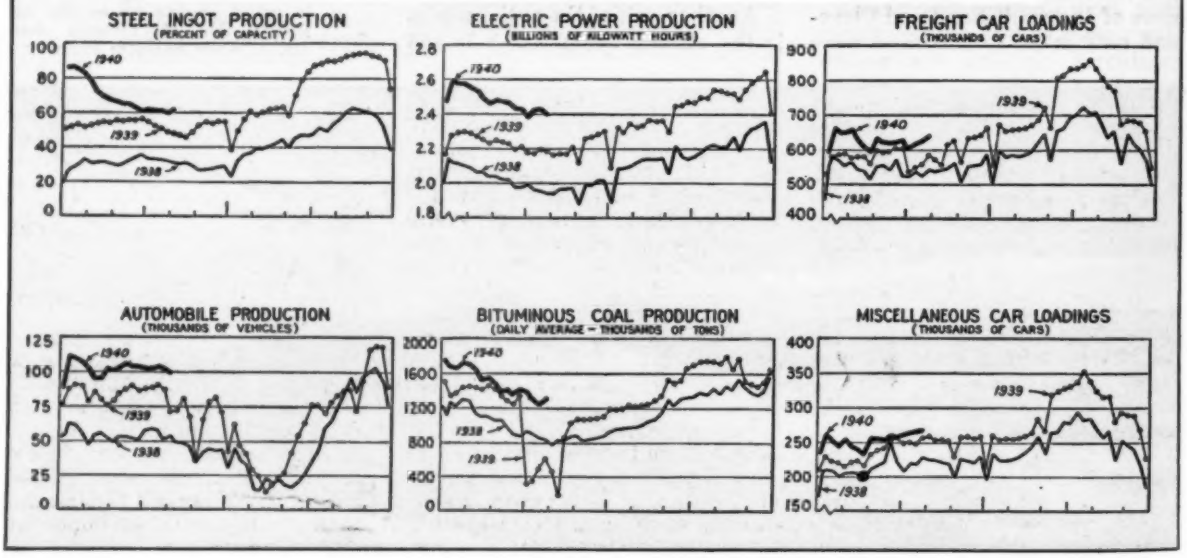
Increased industrial activity, as well as military preparedness, calls for good roads. Our lagging highway expenditures must be increased to build new highways and more carefully maintain the old. Public opinion, already rising against the diversion of highway funds, should soon force the spending of the entire road dollar on the roads themselves.

A growing market for foodstuffs is an added incentive for the reclamation of land now idle through lack of irrigation facilities. This will mean speeding up existing projects, and getting the land under actual cultivation.

Neutral America's preparedness program and export activities means active production in all fields—and that means there will be plenty of peacetime digging to do.

What's in store if the United

WEEKLY BUSINESS INDICATORS



States enters the war? Our entry into the European conflict would only intensify the activities reported above. Offensively and defensively, our military forces would be dependent on well built and maintained highways. Mines, quarries, and aggregate plants would be called upon to supply the fuel and metal for our war machine. American industry would be strained to the utmost to build this machine and keep it intact.

We all want peace, but war or peace, the excavating contractor must prepare to handle the job ahead.

April Construction Figures

Residential contracts awarded in April in the 37 states east of the Rocky Mountains were the highest since October, 1929, according to the F. W. Dodge reports. This April volume, amounting to $135,420,000, exceeded the total recorded for April, 1939, by 18 per cent. Awards for both apartments and one-family dwellings showed substantial gains.

In terms of better housing conditions, the increase in dwelling units was also striking: whereas the $114,405,000 total reported for residential construction in April, 1939, afforded 22,122 dwelling units, last month's total of $135,420,000 provided 27,418 units—a 24 per cent increase.

Private-ownership residential construction, as differentiated from publicly-financed projects, amounted to $119,706,000 or 88 per cent of the April total. This volume for private residential construction is the highest since this separate record was begun in 1932 by the F. W. Dodge Corporation.

In the non-residential classification, commercial and manufacturing building, the best barometers in the construction field of general business sentiment, continued to show major increases over the corresponding month of last year. Commercial building was up 13 per cent; manufacturing building, 35 per cent.

Although the total volume of contracts awarded in April fell 9 per cent short of the volume for the corresponding month last year, the total awards for private ownership construction were 16 per cent ahead. Public construction contracts, on the other hand, lagged 35 per cent behind April, 1939.

It is obvious that for this year's program to catch up with that of 1939, there should be considerable increases in public projects during the coming months; speeding up of public housing and highway contracts seems likely during the summer and early fall.

"We sure need a new set of arm signals, I can't understand a thing they're trying to say."

Irrigation in Brazil

To hear the story of Brazil's great irrigation-agrarian development, one would almost think himself listening to the American engineers who have been working in our own Far West. Like other jobs of harnessing rivers and turning them into new channels, it has been under way for years; will require more years for completion. But even now, much has been accomplished. Agricultural experiment stations and model farms have been established, new highways and bridges have been constructed and arid land is already receiving its life-giving water.

The development affects six northeastern states — Sergipe, Bahia, Ceara, Rio Grande do Norte, Parahyba and Pernambuco. Wholly incidental to the construction of dams, reservoirs and aqueducts is a highway program, with mileage equivalent to the distance from New York to Kansas City. Affected by the job is a population of 6,053,000 Brazilians, in an area of 285,000 square miles. Rivers must be diverted, water mechanically elevated, vast areas drained or brought under control.

Largest dam is the General Sampaio, on the Curu river, about 90 miles from Fortaleza, capital of Ceara, with a capacity of 18,300,000 cubic feet, irrigating 17,500 acres. Sampaio is of earth, with inner face of stone and concrete. Its maximum height is 120 feet overall, length 728 feet, with maximum thickness of 649 feet at the base and of 26 feet, at the crest. Next comes the Curema dam, near Pianco, Parahyba, irrigating 25,000 acres, the project comprising four separate dams. Most impressive, in statistics of water capacity, is the Oros project, on the Jaguaribe river, the total area of which embraces some 325,000 acres. Here may be installed a station generating some 10,000 h.p.

Second in size of the dams already completed is the Piranhas, on the river of that name in Parahyba. Its basin is 7,000 square miles. The Oros-Lima Campos tunnel, in Ceara, has entailed large expenditures. It connects the Lima Campos and the Oros basins, with an over-all length of 5,196 feet and a discharge capacity of 1,950 gallons per minute.

Total reservoir capacity of the six-State program is 2,500 billion gallons. In financing the broad project, the federal government of Brazil, through the Inspectorate of Drought Control, contributes 70 per cent where the properties of private interests are concerned and 50 per cent where states or municipalities are the beneficiaries.

Wild roses will be planted on all the slopes of the German autobahnen, in order to increase manufacturers' output of vitaminous preparations and tonics. Experimental planting last year yielded 25,000 tons of berries for the production of hip-mash, an important vitamin source.

Equipment you ought to KNOW ABOUT

Pipe Anticipator

A new automatic signal device, designed to forewarn the excavator operator by an audible signal as his bucket approaches hidden underground service pipes or cables, has been announced by Wallace & Tiernan Products, Inc., Belleville, New Jersey. Known as the WTP Automatic Pipe Anticipator, the manufacturer claims that this new unit will pay for itself, on difficult jobs where pipes are many and work is slow, in as little as one or two days.

The Pipe Anticipator is recommended for use in street excavation for installing or repairing pipe or cable lines, for electric power, communication, traffic signal, fire alarm, water, gas or sewer; for subway, highway or street construction; at power plant and industrial yards requiring any kind of excavation; at petroleum and natural gas pipe line systems, for installation near other lines or for finding, uncovering and repairing existing lines; and for dredging where pipes and cables may exist in channels.

The Pipe Anticipator may be attached to any type of excavating or pushing machine. It produces a continuous sound which the operator hears either through a loud speaker or ear phones. As the bucket of the excavator approaches a pipe or cable obstruction, the sound volume increases. It is said that the operator requires very little experience to dig within a few inches of hidden pipes or cables with assurance. Thus, the removal of excavated material, otherwise requiring laborious hand tool methods, may be accomplished quickly and efficiently by machine.

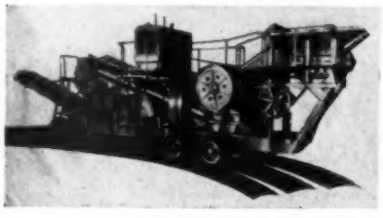
For further information concerning the Automatic Pipe Anticipator, write Wallace & Tiernan Products, Inc., Belleville, New Jersey.

New Portable Quarry Plant

Diamond Iron Works, Inc., and the Mahr Manufacturing Company Division, announces its new portable quarry plant. This new Diamond Iron Works quarry unit receives rock direct from the quarry shovel dipper to the receiving hopper. A 30-inch x 50-foot apron feeder, with manual control, discharges over a grizzly screen, the oversize quarry rock going into a 15-inch x 24-inch crusher, and the undersize material is by-passed to the belt conveyor under the jaw crusher.

The jaw crusher also discharges to the belt conveyor mentioned above. This conveyor delivering all material to the large vertical rotor-lift that elevates the product to the main conveyor for delivery to the 4-foot x 8-foot single deck Diamond vibrator screen.

Sized material passes the screen to the hopper below that feeds the delivery belt conveyor.



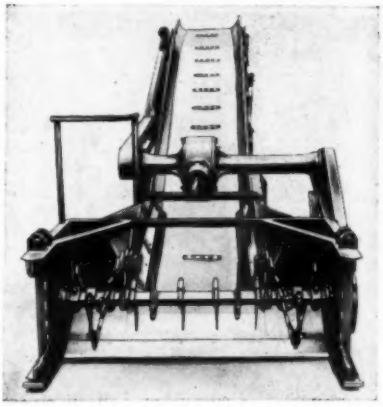
Oversize is discharged to a 26-inch x 20-inch roll crusher and carried back by a belt conveyor to the vertical rotor-lift for recirculation over the screen. This plant can be equipped with a double or triple deck screen and chip eliminator when desired.

The outfit is equipped with dual pneumatic tires and mechanical brakes. It is a self contained unit driven by a 90 to 100 horse power diesel engine mounted overhead or from an auxiliary engine.

Model "99" Loader

Austin-Western Road Machinery Company, Aurora, Illinois, announces its Model "99" Loader, a new means for removing surplus material from shoulders along paved highways, and loading it into trucks for disposal.

The Model "99" Loader is a belt conveyor loading attachment for the A-W "99" Power Grader, for picking up and delivering into trucks, all waste material on, or a part of, shoulders. The collecting



bowl at the bottom gathers the dirt as the "99" Power Grader moves forward, and by means of ribbon screws and cutters, feeds the dirt onto the moving belt. A regular grader blade-bit at front of collecting bowl has a combined cutting and levelling action.

Power for the "99" Loader is taken from the main engine, through a special clutch, and control of belt movement is instantaneous and constant by the loader operator. The "99" Loader attachment is suitable for any "99" Power Grader, new or old.

For further information about the Model "99" write the Austin-Western Road Machinery Company, Aurora, Illinois.

Sinking Drill

Described as a sinker to fill the need for a drill in a size between the widely used 55-lb. type and the heavier machines weighing

LANOVA *endorses* RPM DELO

DIESEL ENGINE LUBRICATING OIL

—after gruelling tests in high-speed Diesels

Lanova Corporation minces no words:

"We have used your RPM DELO very successfully in test engines as well as conversion engines under all kinds of adverse engine conditions. We, therefore, recommend it."

One high-speed Diesel after another in the Lanova laboratory showed: RPM DELO stops ring-sticking. RPM DELO stops bearing corrosion. RPM DELO stops sludge trouble. *And RPM DELO is the only oil that does all three!*

What's more it reduces engine wear to a new low because of its unique ability to *spread* and lubricate hot metal surfaces. It never runs away from intense heat as many oils do—never lets engine parts run dry.

Reasons aplenty why RPM DELO is recommended as the *right* oil for all Diesel engines using the Lanova System of controlled combustion. And thousands of test hours—thousands of test miles by leading engine manufacturers prove it for Diesels of every type and size. Give your engines RPM DELO—and profit by it!

Order from Your Nearest Distributor as Listed Below:

IN THE UNITED STATES

RPM DELO:
The California Company (Montana only)
Humble Oil & Refining Company
Standard Oil Company (Indiana)
Standard Oil Company (Nebraska)
Standard Oil Company of California
Standard Oil Company of Texas
Utah Oil Refining Company

Diol RPM DELO:
The Carter Oil Company, Tulsa, Oklahoma
Colonial Beacon Oil Company
Standard Oil Company of Louisiana
Standard Oil Company of New Jersey
Standard Oil Company of Pennsylvania

Kyso RPM DELO:
Standard Oil Company (Inc. in Kentucky)

Signal RPM DELO:
Signal Oil Company

Sohio RPM DELO:
The Standard Oil Company (Ohio)

IN CANADA & NEWFOUNDLAND

Imperial RPM DELO:
Imperial Oil Limited

IN BRITISH COLUMBIA & ALBERTA

RPM DELO:
Standard Oil Company of British Columbia Limited

THROUGHOUT THE WORLD

RPM DELO is available through distributors in more than 100 countries.

RPM
REG. TRADE-MARK
DIESEL ENGINE LUBRICATING OIL

Unequaled for every Diesel

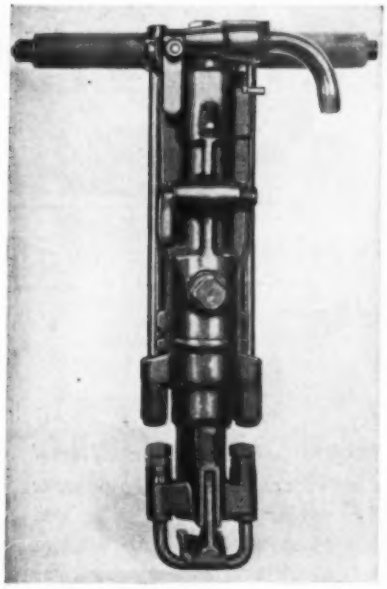
STANDARD OIL COMPANY OF CALIFORNIA

For your convenience in writing to Standard Oil Company of California, you will find a card bound in this issue.

75 to 80 lbs., a new 67-lb. sinker, known as the S-73 has just been announced by the Gardner-Denver Company, Quincy, Illinois. According to the results of company tests, this new sinker has the speed and power of larger drills. In actual operation, it has been demonstrated that it has the speed and power to drill in hard ground as fast and deep as the heavier drills. It is interesting to note that the air consumption is no more than that of the average 55 lb. drill.

As a result, the Gardner-Denver Company recommends this new sinker for use where increased footage in hard ground is desired—for general drilling in the construction and quarry industries and in shaft sinking.

Four-pawl rotation feature, which has proved successful in other Gardner-Denver drills, is incorporated in the S-73. The pawls



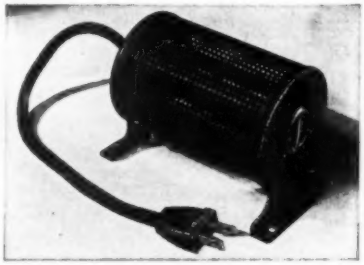
are reversible. The valve design permits unrestricted admission of air with an extremely short valve stroke. The drop forged cylinder has a bushing with renewable bronze liner. The chuck end is drop forged and is available in any style. A large oil reserve surrounds the cylinder bushing and feeds oil automatically to all working parts and the drill. The sinker has ¾" side rods of special stock, with long cap nuts.

General Utility Resistor

A line of general-utility, voltage-dropping resistors is announced by Clarostat Manufacturing Company, Inc., 285-7 North Sixth Street, Brooklyn, New York.

When writing to manufacturers please mention Excavating Engineer.

Series HT units are now avail-



able in any resistance and wattage rating from 100 watts up. According to the manufacturer they can be used for any voltage-dropping or current regulating purpose, such as the operation of 110-volt equipment on 220-volt supply, the dimming of photo-flood lamps, the operation of soldering irons and electric motors, and so on. A Clarostat Greenahm power resistor is the heart of this device. It is housed in a 3-inch diameter perforated metal shell 4½ inches long, with mounting feet, for the 100-watt size, finished in high-temperature baked-enamel. Units are available either with short connection cord and female Edison receptacle, or again with male and female Edison receptacles.

New Air Hose

Designed especially for heavy duty pneumatic tool service is Goodyear Tire & Rubber Company's new Red Wing air hose. Introduced by the company's Mechanical Goods Division (Akron, Ohio) Red Wing air hose is

comprised of three principal components.

The tube is of non-porous rubber, resistant to action of hot and cold air. Lubricants in the air will not cause swelling or flaking, obviating clogging of tools with rubber particles, according to the manufacturer.

Reinforcement is provided with three plies of multiple-braided, special cabled cotton yarn, providing a safety factor for working pressures and high resistance to blows and impacts.

The cover is a heavy gauge of soft red rubber with a high tensile strength, providing resistance to cutting from rocks, ore, or other materials. It likewise is abrasion and sun-resistant.

Red Wing air hose is available in ½-inch, ¾-inch and 1-inch sizes.

Spray Line Marker

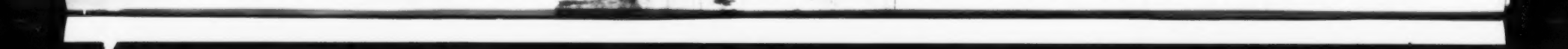
Binks Manufacturing Company, 3114-40 Carroll Avenue, Chicago, announces the production of the new No. 240 Spray

Line Marker, which is a complete self-contained portable spray unit for the marking of traffic lines for highways, city streets, warehouses, airports, steel mills, large factories, and wherever traffic lines are important.

Manufacturer claims the unit is ideal for one man operation and will lay down a stripe from 2" to 6" in width at the rate of one to four miles per hour, depending on the condition of pavement or floor.

Equipped with a ¾ h.p. gasoline engine and four penumatic tires, the unit is easy to handle. The operator has a clear view at all times of the old stripe or the guide lines laid down. A 12-gallon material pressure con-

(*Continued on page 378*)



On Schedule!

WHEN time is an essence and penalties threaten, it's comforting to know that your power is dependable. "Caterpillar" Diesel Engines are built for just that . . . and more! There's ruggedness in their design, quality in their materials, and precision in their manufacture.

When the job calls for long shifts they've the stamina and mechanical simplicity for "keeping everlastingly at it"—even though the going may be tough. (There are absolutely no operating adjustments on the fuel system; and no frequent nor delicate adjustments of *any* kind are necessary.)

When the load goes on, there's no wasted pick-up time. You get quick response at all times.

And when, eventually, you do need service or parts replacements, they're readily available—through the most complete engine-servicing facilities in the world.

CATERPILLAR TRACTOR CO., Peoria, Ill.

• A "Caterpillar" Diesel D6600 Engine powers the Bucyrus-Erie shovel shown above handling base course surfacing material—500 cu. yards per 8-hour day. Engine uses only 1 3/5 gallons of 8 2/5c fuel per hour.

LOW-COST ELECTRICITY

for lighting your operations or light-and-power for your machine shop . . . through one of these new low-priced "Caterpillar" Diesel-Electric Sets. Simple, compact, easily installed or transported. Completely self-contained and self-regulating. . . . No switchboard or other outside controls. And operating costs *only about 1c per kw. hr.* (depending on average load and local price of Diesel fuel).

"Caterpillar" Diesel Engines are chosen to power the products of leading manufacturers of excavating, contracting and industrial equipment. You can get them in the equipment you buy—by demanding them. 34 to 190 maximum horsepower.

CATERPILLAR

REG. U.S. PAT. OFF.

DIESEL ENGINES AND ELECTRIC SETS • TRACK-TYPE TRACTORS • ROAD MACHINERY

Field NOTES

Emergency Appendicitis Care

If you ever have a severe, continued abdominal pain, don't try to bear it like a Spartan or decide that it calls for a cathartic or some other self-prescribed treatment. It might be appendicitis.

There were 14,300 deaths from appendicitis in this country during 1938. Nearly all of these deaths could have been prevented had a doctor been called promptly and surgical attention obtained when necessary.

Appendicitis is an inflamation of the appendix, that small and seemingly useless organ located in the lower right part of the abdomen and attached to the large intestine. A cramplike pain in this region is an early symption of appendicitis, although in many cases the pain is general or in other parts of the abdomen. The pain may be severe or mild. It may be accompanied by fever and nausea. If these symtoms are present, (1) consult a doctor at once; (2) do not take a laxative, food, or medicine; (3) remain quiet and apply an ice bag while awaiting the doctor.

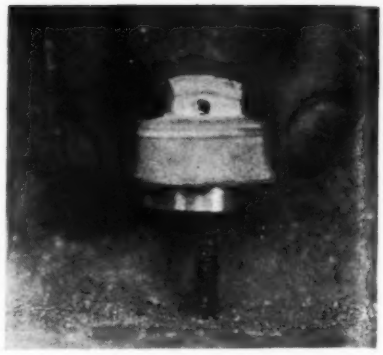
It is not safe to attempt self-treatment. In the case of acute appendicitis taking a laxative may cause the appendix to rupture and result in peritonitis with possible death. The treacherous thing is that, should the appendix burst, the pain may lessen giving the patient the false notion that he is better when he is really worse. That is why it is absolutely essential that no one but a physician should diagnose the case and prescribe treatment.—*Metropolitan Life Insurance Company*

Basin Stopper Grip for Small Dies

It is often necessary to use small dies in places where the usual stock or holder cannot be turned. This situation is of course often encountered in repair work where small threads are found "burred" or rusted. A great deal of extra work can be eliminated if the die can be used in difficult places.

Small round dies of this type are close to an inch in outside diameter, and will fit snugly into the bottom cavity of a common 1¼ inch wash basin stopper. This affords a good grip for the fingers to start and turn the small die in about any place the fingers can reach. The ring portion of the stopper can be cut off and a small hole cut through the stopper if the part to be re-cut is too long.

—*Frank Bentley.*



● This basin stopper makes a convenient grip for using small dies in "tight places."

Haulage Contract Holds

Where a subcontractor's contract for haulage of excavated materials was silent as to the type of equipment to be used, he cannot escape the obligations of his agreement on the ground that weather conditions prevented continued use of ordinary trucks and necessitated use of trucks of the caterpillar type, which he did not have. That was the principal point decided by the Washington Supreme Court in the recent case of J. D. Harms, Inc., v. Meade, 57 Pac. 2d, 1052.

Another point incidentally involved in the case was whether or not the subcontract imposed mutual obligations and was therefore binding on the subcontractor, who attempted to escape liability on the ground that the agreement was not binding on the excavating contractor and therefore was not binding on him, because there can be no valid contracts unless both parties are bound. The court held that the agreement was mutually binding.

As to the subcontractor's excuse for quitting haulage for materials, because Mrs. Meade, the subcontractor, did not have the tractor-type trucks necessary in wet weather, the court said:

"But the contract does not say that. Either upon consideration of the purposes for which the contract was entered into or by its terms, that contention is not warranted. The purpose of the contract on the part of either or both of the parties was not to provide work for which Mrs. Meade's trucks were suitable so that they might be put to use, but that by the joint action of the parties to the contract material excavated should be hauled away. Harms was under contract with the Unit-

● In building structures along the Gravity Main Canal on Arizona's Gila Project the Jahn & Bressi Construction Company speeded up cutting and handling of light reinforcing steel by mounting a hand shear in the center of a flat rack truck, and a hand bender on the front corner of the metal rack.

The Importance of an Adequate *Safety Factor** For Your Wire Rope

**The Safety Factor of a rope is the number of times the rope is stronger than the load.*

This is NO. 4 IN A SERIES *of informative articles for wire rope users prepared by the Macwhyte Wire Rope Company*

Engineers explain it as "the ratio between the rated breaking strength of the rope and the load applied to the rope."

A wire rope operated with an inadequate Safety Factor is like a small man lifting a very heavy load. He may do it successfully for a period of time—but eventually he'll strain a muscle or receive a permanent injury which may shelve him for life. That kind of operation is costly. Make sure you have an adequate SAFETY FACTOR for ropes on all your loads.

HOW TO FIGURE: If a crane (having a single part line) is equipped with a rope having a breaking strength of 12 tons, and is required to lift a load weighing two tons, the Safety Factor of the rope is 6—adequate in this case (see Illustration and Table).

If the rope were required to handle a 3-ton load the Safety Factor would then be only 4—too low for safe, economical operation (see Illustration and Table).

THE VALUE OF AN ADEQUATE SAFETY FACTOR—

By allowing an adequate Safety Factor for all ropes, safe operation of your equipment is assured, longer, lower cost service is obtained from the rope. Here's why:

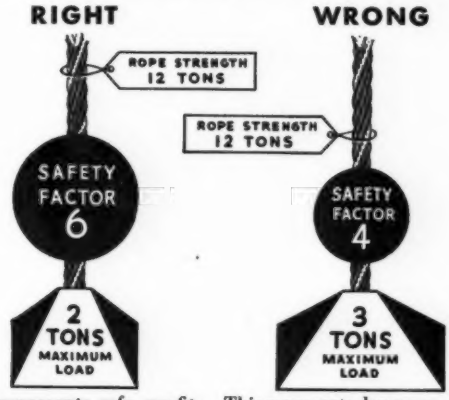
1. Overloading is prevented.
The ability of wire rope to withstand bending or fatigue decreases rapidly when loaded too heavily. This is one of the greatest causes of rope failure.

2. Service life is increased.
With a high factor of safety the pressure per square inch between the rope and sheave or drum (or other object along the path of rope travel) is less, thereby reducing the rate of wear. A wire rope with a Safety Factor of 6 will last approximately twice as long as the same rope operating with a Safety Factor of 3.

3. Safety in operation is increased.
A high initial safety factor in the rope means that after its strength is reduced by wear or broken wires that a greater reserve strength remains. This means greater protection against accidents to men and machinery.

AVOID COSTLY AND DANGEROUS OVERLOADING

. . . Make Sure You Have An Ample Safety Factor



This represents safe, profitable practice for a crane rope.

This represents dangerous, costly practice. Safety Factor is too low.

MINIMUM SAFETY FACTORS

Established After Many Years of Experience and Testing

Type of Service	Minimum Safety Factor
Guys—Derricks	5
" —Stacks	3.5
Shovels, Cranes, Excavators	5
Overhead Traveling Cranes	6
Hot Ladle Cranes	8
Electric and Air Hoists	7
Track Ropes	4
Derricks	6
Mine Shafts—Up to 500′ deep	8
500′ to 1000′ deep	7
1000′ to 2000′ "	6
2000′ to 3000′ "	5
Over 3000′ "	4
Passenger Elevators — Car Speeds 250′ per min.	9
500′ " "	10.25
800′ " "	11.25
1000′ " "	11.6
Miscellaneous Hoisting Equipment	5

NO. 4E8

MACWHYTE ENGINEERS are always at your service to recommend the correct ropes for your needs.

Copies of this and previous articles on how to get the most out of your wire rope are available. Send us your name and title on company letterhead and copies will be sent you without obligation.

MACWHYTE COMPANY

Kenosha, Wisconsin. Manufacturers of PREformed, Internally Lubricated, Laboratory-Tested and Field-Proved Wire Rope—and Braided Wire Rope Slings.
New York . . . Pittsburgh . . . Chicago . . . Ft. Worth . . . Portland . . . Seattle . . . San Francisco.
(Distributors throughout the U. S. A.)

For your convenience in writing to Macwhyte Company, you will find a card bound in this issue.

ed States to build a road, which involved the excavation and hauling of materials. Mrs. Meade, the subcontractor, was desirous of entering into an agreement with the contractor for hauling all excavated materials. She did enter into such an agreement without qualification, as to the means of hauling it. * * *

"As we understand the proof, Mrs. Meade did not know whether she had trucks enough to handle the haulage, even with good luck all of the time, but she thought that she could get others as and when needed. * * * But that was all a matter of detail and her own responsibility. It was not provided that she should furnish sufficient trucks of the kind she then had, the nontractor type, on duty at all times to handle the work. Had that been intended, it could easily have been expressed in the contract. The contract simply provided that she shall 'furnish sufficient trucks on duty at all times to handle the work (each truck having a minimum capacity of 6 yards),' an agreement wholly unqualified except as to the minimum capacity of each truck, which detail was manifestly intended as a suggestion in co-ordinating the work of excavating the material with that of hauling it. Such matters of detail, for the purpose of performance, do not go to, nor enter into, the essence of the subject-matter of the contract, unless so stated. Courts cannot set aside contracts because the performance of them becomes more difficult or more expensive than when they were entered into."

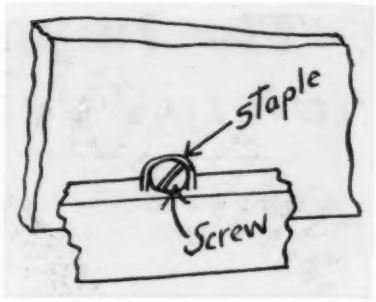
As to the validity of the contract as imposing mutual obligations, the court decided that "this contact, from the words employed, shows the intention of the parties. The subject-matter is not in doubt, but clearly expressed. It is not the hauling of some or a part, but all, of the excavated materials in the construction of the highway, the plans, specifications, and profiles of which the parties had before them in the government contract which was referred to in the contract between these parties. The contractor agreed to pay the specified amount for the yardage hauled, and Mrs. Meade agreed to do the hauling. It is a case of a written contract in which one party agrees to pay—mutual covenants, a promise for a promise.

"Appellant's contention is, as we understand it, that the contract should have contained an additional specific provision that 'Harmes agrees to deliver the excavated material to be hauled by Mrs. Meade,' or words of similar import. How much plainer would that have made the contract? By undeniable implication that is precisely what the contract means, taken altogether, so that if resort need be had to this common method of ascertaining the meaning of the contract, the result is the same."

—Arthur L. H. Street

Screw-Staple Fastener

Sometimes you want to fasten two overlapping strips of wood together. You don't want to nail them together, or cannot, and



● This handy screw-staple fastener kink will solve many a tricky wood joining problem.

there isn't enough overlap to screw through either piece of wood without cracking or weakening the pieces.

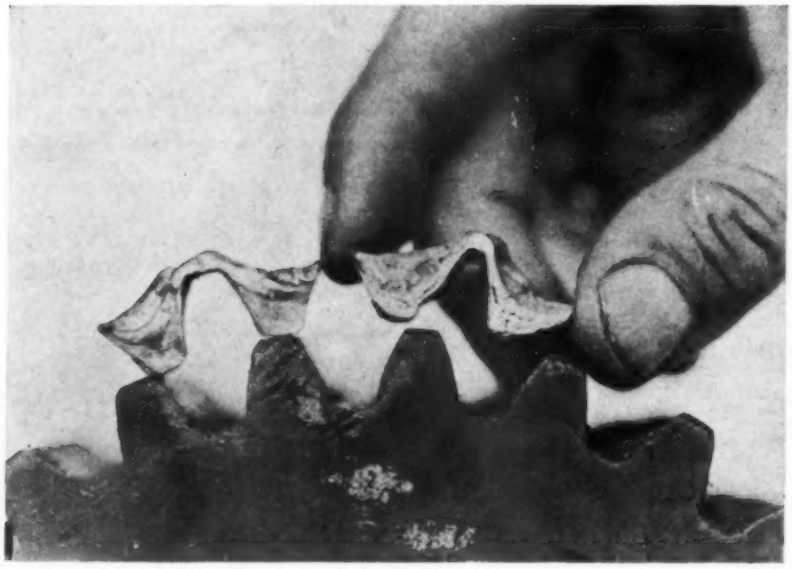
The accompanying sketch shows a convenient and useful kink which has served the purpose very well in many instances. Simply drive a staple into one of the strips as indicated, leaving an opening just large enough for the screw to pass through. Then drive the screw, turning it until the two pieces are drawn together firmly. Use as many staples and screws along the strip, in this way, as may be necessary to hold the two pieces together securely.

—N. G. Near.

Gear Teeth Molds

An operator of some isolated machinery had reported the condition of several spur gearing teeth. He was asked for an exact report of their condition. The accompanying illustration shows the rather novel way in which it was made.

The end of a tooth in good condition was cleaned off and about one-half inch of it was covered with common plastic wood. Some of the teeth in poor condition were also cleaned and covered in the same manner with the wood. The wood was left on the teeth during the over-Sunday shutdown, and removed when hard. The two molds shown here are the result. The one to the left shows the shape of the unworn tooth with its correct respective pitch and other dimensions, while the one to the right, taken from a worn tooth, plainly told its condition. The evidence resulted in some immediate repair work. — *Frank Bentley*



● Molds made of ordinary plastic wood can be used to efficiently report the condition of worn gear teeth.

SIMPLICITY MEANS PERFORMANCE

Bucyrus-Monighan Walking Draglines have made a world-wide reputation for dependable performance in heavy digging. Behind this performance is simplicity of design that means real efficiency. Notice in this picture of the 3-W how the machinery is located well back, to provide good rope leads and to give maximum counterweight effect. Notice the size of the various parts, the lack of complicated gadgets, gears or shafts. Bucyrus - Monighan simplicity means smooth performance and minimum maintenance, both in digging and in walking. These outstanding draglines are available in a complete range of job-proven sizes.

BUCYRUS MONIGHAN

Sold by

Bucyrus·Erie

SOUTH MILWAUKEE, WISCONSIN

For your convenience in writing to Bucyrus-Erie Co., you will find a card bound in this issue.

Shots from the FIRING LINE

AGCA Opposes WPA Construction

H. B. Zachry, Laredo, Texas, national president of the Associated General Contractors, opened the three-day spring meeting of this organization's governing and advisory board in Milwaukee, Wisconsin, on May 6.

Keynoting his speech against WPA's invasion of the private construction field President Zachry said, "By invading the construction field, the WPA is putting employed building trades workers on relief so that unemployed men already on relief may have jobs."

Mr. Zachry further asserted that the increasing tendency of the WPA to go into the construction field was due to the fact that politicians wanted to have something tangible in the way of permanent improvements to show for the money spent for relief.

The note sounded by President Zachry was taken up by Edward J. Harding, Washington, D. C., managing director of the association in his report on activities of the organization so far this year.

"Unless WPA is curbed drastically in its construction operations, construction employment cannot be maintained," Mr. Harding said. "Construction will not be able to hold its own employees and the result will be increased relief load. This is the story we are telling the nation and the story which is backed up with facts.

"The association is not opposed to economy in government, but insists on true economy. It is not economy when a large segment of the construction industry is invaded and when its workers must gravitate to the relief rolls.

"The association insists that there is a problem of keeping people employed who are now employed, that nothing can be gained by throwing practically the entire body of employables on the relief rolls into the construction industry and displacing an equal number of employes in private industry."

Director Harding said the Associated General Contractors was the first national organization to challenge the WPA policies and was proud of its role of focusing attention on the issue.

Jurisdictional disputes between labor organizations, which formerly greatly hampered building operations, have been almost eliminated in the last year, J. D. Marshall, Washington, D. C., secretary of the labor relations division, reported at the meeting. He ascribed the result to the "splendid cooperation" the organization had received from the building and construction trades department of the AFL.

● **Present war maneuvers along Belgium's Albert canal lend a timely note of interest to this construction view of the canal taken several years ago.**

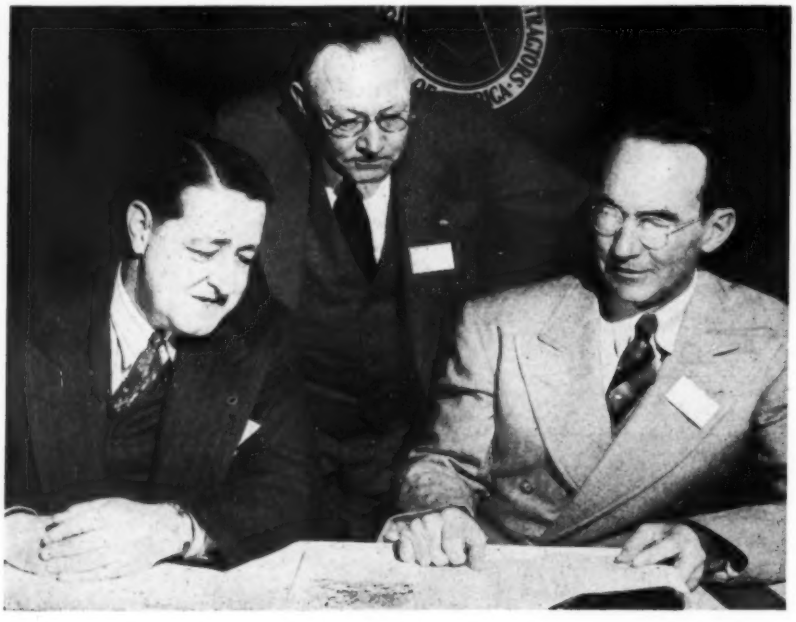
"Topping-Out" Fort Peck Dam

Work on topping-out the Fort Peck dam has been started by J. A. Terteling and Sons, Boise, Idaho, contractor for raising the dam to its ultimate elevation.

At present the contractor is using four 22-yard scrapers and one 20-yard scraper to haul excess material from the upstream face at the east abutment of the dam to the top of the east end of the dam. Two 95 h.p. pusher tractors are being used to assist in loading the scrapers and a bulldozer is being used for building necessary roads, trimming slopes and doing other miscellaneous work.

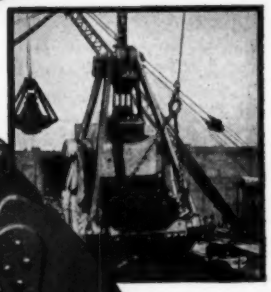
The material to be used in topping-out the dam includes 66,300 cubic yards of glacial till which will be hauled from a borrow pit at the west abutment of the dam by trucks and placed along the axis of the dam to complete the relatively impervious rolled-fill core. The remaining 1,300,009 cubic yards of pervious material to be handled is hydraulic fill which was previously placed by the dredges on the faces of the dam outside the final section and in the immediate vicinity of the work.

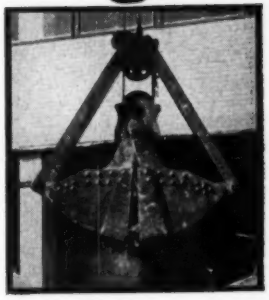
Topping-out the dam is the last large



● **AGCA officials talk it over at their spring meeting in Milwaukee. (L. to R.) Edward J. Harding, managing director; Walter Winding, vice-chairman, Milwaukee committee; and H. B. Zachry, national president. (Milwaukee Journal Photo.)**

YOU CAN'T BEAT HAISS Hi-Power FOR PAY LOAD DIGGING





That is SO, today! In the last two or three years, the Haiss Bucket has climbed right up to the top in contractor preference. The reason is simple. . . . THE PRESENT-DAY HAISS BUCKET HAS ENOUGH MORE OF DIGGING POWER AND STAYING POWER TO MAKE THE DIFFERENCE COUNT. Look at the big, heavy lips and teeth—and non-clogging sheaves! In stock at New York, Hartford, Philadelphia, Harrisburg, Baltimore, Atlanta, Birmingham and Los Angeles.

• *Write or wire for prices; all sizes. Descriptive bulletin on request.*

GEORGE HAISS MANUFACTURING CO., INC.

144th ST. & PARK AVE., NEW YORK, N. Y.

BUCKET LOADERS—PORTABLE CONVEYORS—HOPPER GATES—REVOLVING SCREENS

For your convenience in writing to George Haiss Mfg. Co., Inc., you will find a card bound in this issue.

earth-moving work at the Fort Peck dam and will bring the dam to its final elevation 250 feet above the Missouri river bed. This feature of construction on the Fort Peck project is scheduled to be completed this year.

Report 1940 Federal Aid Bill

The Federal Highway Act of 1940 (H.R. 9575) was favorably reported to the House in April. Redrafted in committee, the bill differs substantially as originally introduced. In addition to inserting the sums, which were left blank in the original, the committee has inserted several other provisions including an entire revamping of Title II of the original bill pertaining to federal assistance in the acquisition of right-of-way.

As reported by the House Roads Committee, the bill contains authorizations for the fiscal years 1942-43 in amounts equal to those provided for in the Hayden-Cartwright Act of 1936. These amounts are as follows:

Federal aid	$125,000,000
Secondary or feeder roads	25,000,000
Grade-crossings	50,000,000
Forest highways, etc.	14,000,000
Indian lands, etc.	2,500,000
National parks, etc.	7,500,000
Parkways	10,000,000
Indian roads	4,000,000

In lieu of Title II the House Roads Committee reported favorably a new section (Section 12) authorizing the R.F.C. to cooperate with states to finance or to aid in financing, the acquisition of right-of-way necessary or desirable for road projects. It further provides that agreements with the R.F.C. can only be made after approval of the project by the state highway department and by the Public Roads Administration. In addition to normal security by the R.F.C. on its loans and purchase agreements the Federal Works Administrator is authorized, in case of default of any such loan or agreement by a state, to deduct from that state's share of federal aid such funds as remain unexpended and pay the same over to the R.F.C.

In other words, a state's apportionment of its share of federal aid funds would be pledged to secure any transaction entered into by such state and the R.F.C. for the acquisition of right-of-way to the extent of unexpended balances. The bill further changes existing law by amending Section 1 (c) of the 1938 Act to provide under certain conditions for the purchase of lands adjacent to highways of primary importance for beautification work; and that five per cent of federal aid funds apportioned to any one state may be used for the purchase of such adjacent land without being matched. Title II of the original bill (right-of-way section) has been eliminated, and Section 12 added thereto.

While the bill as reported by the House Roads Committee is most desirable, nevertheless, considerable difficulty is anticipated in securing Congressional approval. Due to strenuous objections in certain quarters the bill has hit a legislative snarl which will require considerable effort to unravel.

Approximate apportionments of Federal-aid highway and grade crossing funds proposed in HR 9575

(These amounts are for each of the fiscal years ending June 30, 1942, and 1943)

STATE	FEDERAL AID	SECONDARY OR FEEDER	GRADE CROSSING	TOTAL
Alabama	$ 2,587,000	$ 517,000	$ 982,000	$ 4,086,000
Arizona	1,780,000	356,000	319,000	2,455,000
Arkansas	2,125,000	425,000	850,000	3,400,000
California	4,747,000	950,000	1,852,000	7,549,000
Colorado	2,261,000	452,000	627,000	3,340,000
Connecticut	781,000	156,000	414,000	1,351,000
Delaware	609,000	122,000	244,000	975,000
Florida	1,684,000	337,000	694,000	2,715,000
Georgia	3,137,000	627,000	1,222,000	4,986,000
Idaho	1,533,000	307,000	405,000	2,245,000
Illinois	5,055,000	1,011,000	2,574,000	8,640,000
Indiana	3,031,000	606,000	1,264,000	4,901,000
Iowa	3,169,000	634,000	1,365,000	5,168,000
Kansas	3,236,000	647,000	1,261,000	5,144,000
Kentucky	2,275,000	455,000	890,000	3,620,000
Louisiana	1,797,000	359,000	774,000	2,930,000
Maine	1,090,000	218,000	337,000	1,645,000
Maryland	1,026,000	205,000	500,000	1,731,000
Massachusetts	1,718,000	344,000	1,017,000	3,079,000
Michigan	3,767,000	753,000	1,617,000	6,137,000
Minnesota	3,371,000	674,000	1,306,000	5,351,000
Mississippi	2,193,000	439,000	775,000	3,407,000
Missouri	3,729,000	746,000	1,487,000	5,962,000
Montana	2,534,000	507,000	661,000	3,702,000
Nebraska	2,531,000	506,000	871,000	3,908,000
Nevada	1,589,000	318,000	244,000	2,151,000
New Hampshire	609,000	122,000	244,000	975,000
New Jersey	1,653,000	331,000	975,000	2,959,000
New Mexico	2,004,000	401,000	415,000	2,820,000
New York	6,057,000	1,211,000	3,334,000	10,602,000
North Carolina	2,905,000	581,000	1,257,000	4,743,000
North Dakota	1,908,000	382,000	770,000	3,060,000
Ohio	4,477,000	895,000	2,082,000	7,454,000
Oklahoma	2,904,000	581,000	1,142,000	4,627,000
Oregon	2,049,000	410,000	559,000	3,018,000
Pennsylvania	5,276,000	1,055,000	2,818,000	9,149,000
Rhode Island	609,000	122,000	244,000	975,000
South Carolina	1,661,000	332,000	741,000	2,734,000
South Dakota	2,013,000	403,000	669,000	3,085,000
Tennessee	2,600,000	520,000	932,000	4,052,000
Texas	7,787,000	1,557,000	2,717,000	12,061,000
Utah	1,407,000	281,000	323,000	2,011,000
Vermont	609,000	122,000	244,000	975,000
Virginia	2,267,000	453,000	931,000	3,651,000
Washington	1,966,000	393,000	750,000	3,109,000
West Virginia	1,354,000	271,000	652,000	2,277,000
Wisconsin	3,012,000	602,000	1,209,000	4,823,000
Wyoming	1,566,000	313,000	328,000	2,207,000
Hawaii	609,000	122,000	244,000	975,000
District of Columbia	609,000	122,000	244,000	975,000
Puerto Rico	609,000	122,000	374,000	1,105,000
Admin. and Engr. Reserve	3,125,000	625,000	1,250,000	5,000,000
TOTAL	$125,000,000	$25,000,000	$50,000,000	$200,000,000

Complete Fresno Dam

By F. N. Hollingsworth

Another storage dam, Fresno Dam on the Milk River project in Montana, has been added to the number of Federal reclamation projects which now total 145, of which 83 are storage dams and 62 diversion structures. The new Fresno dam will create a reservoir which will provide a supplemental supply of water for irrigation purposes on the Fort Belknap Indian reservation and for irrigation farms along the Milk river, besides insuring a domestic water supply for several towns and create in addition a migratory waterfowl refuge.

A total of 1,693,170 cubic yards of compacted earth, rock riprap and concrete went into the structure, on which work was started in March, 1937. The dam is 109 feet high and 1,855 feet long and its reservoir has a storage capacity of 127,230 acre-feet, or over forty billion gallons of water. The reservoir formed by the dam is approximately a half mile wide and extends upstream about 22 miles. The outlet works, in the left abutment, have a discharge capacity of 2,200 cubic feet at maximum storage, through the left spillway wall into the stilling pool of the spillway, which is an open chute type with a maximum capacity of 51,000 cubic feet per second.

Included in the construction of the dam are 49,500 cubic yards of rock riprap, and 13,670 cubic yards of concrete. There were 2,430,000 cubic yards of

Eliminates 80% of DRILLING and SHOOTING with LeTOURNEAU ROOTER

MAKING SCRAPER DIRT out of the shale rock and decomposed granite on the Golden Gate Turf Club's 1,200,000-yard track construction at Albany, Calif. The K-30 Rooter has plenty of strength to take the pulling and pushing power necessary for shattering such tough rocky material as this. After Rooting, three LeTourneau Carryall Scrapers and two Angledozers handled all excavation and placement.

New, stronger K-30 Rooter "... dynamite on wheels..." says Jack Casson.

"We gave it the works," Contractor Casson continues, "but in spite of the tough going . . . and the combined power of *two* D8 'Cats' . . . we couldn't find a weak spot in this new LeTourneau K-30 Rooter. It shattered tough granite and shale . . . rooted out boulders weighing at least two tons . . . and eliminated 80% of our drilling and shooting. *It's the best tool of its kind we've ever seen.*"

You can shatter tough, rocky material . . . make profitable scraper dirt of it . . . just as alert Contractor Casson did . . . by using LeTourneau heavy duty Rooters. The new K-30 is built especially for tough jobs—12,250 pounds (all structural steel — no steel punchings) of "toothed dynamite" with heavy, 3-inch shanks strong enough to take the power of 2 pulling tractors and a pusher. Try it on your toughest section . . . see for yourself how the K-30 can cut you into extra profits. Call your LeTourneau - "Caterpillar" dealer . . . NOW . . . ask him to show you on your own job. R. G. LeTOURNEAU, INC., Peoria, Ill., Stockton, Calif.

Check These Money-Saving K-30 Rooter Features

- ✓ **MORE WEIGHT** . . . 12,250 pounds . . . adds to the instant penetration of the **plow-like** digging design . . . and holds the Rooter in the ground with a **natural suction.**
- ✓ **EXTRA STRENGTH** . . . 1-inch steel plate construction — electric arc-welded throughout . . . every ounce of LeTourneau Rooter weight is **structural** strength.
- ✓ **BIGGER SHANKS** of 3-inch heat-treated alloy steel . . . matches added strength with deeper penetration (up to 30 inches).
- ✓ **TOUGHER DIGGING TIPS** of heat-treated die steel . . . **reversible** for extra service . . . easily **replaceable** after long life.

LETOURNEAU

CARRYALL* SCRAPERS, ANGLEDOZERS*, BULLDOZERS, ROOTERS*, POWER CONTROL UNITS, DRAG SCRAPERS, PUSHDOZERS, SHEEP'S FOOT ROLLERS, BUGGIES*, CRANES, TREEDOZERS.

*Name Reg. U. S. Pat. Off.

● Borrow pits on the Willow Point levee in Louisiana are filled by a Bucyrus-Erie 230 dragline to afford greater stability for this large levee.

open excavation and 4,550 cubic yards of tunnel excavation.

Some 21,910 barrels of cement, 450,000 pounds of gates and control piping, 104,000 pounds of miscellaneous steel, 267,600 pounds of bridge steel, 1,500,000 pounds of reinforcing steel and 210,000 pounds of tunnel liners and steel pile were the largest items purchased for the work, the materials coming from fifteen different states.

The contract bid was $980,804, submitted by and awarded to the Wachter-O'Neil Construction Company and Megarry Brothers of North Bismarck, North Dakota.

Twenty Dams for Connecticut Valley

A new plan to aggregate in cost $57,460,000 for combating the flood waters of the Connecticut valley has been worked out by U. S. Army engineers. The revised plan for twenty main reservoirs and dams in Massachusetts, New Hampshire and Vermont and several supplemental dams has been developed as the result of the hurricane of September, 1938, which was followed by damaging floods.

Sites and estimated costs for the proposed structures are as follows: West Brookfield, Massachusetts, $2,317,000; Barre Falls, Massachusetts, $965,000; Honey Hill, New Hampshire, $1,935,000; Sugar Hill, New Hampshire, $6,350,000; Williamsville, Vermont, $6,280,000, of which $32,000 is for installing penstocks for future power development; Cambridgeport, Vermont, $1,975,000; and Brockway, Vermont, $2,944,000. Five of the dams are in Massachusetts, five in New Hampshire and ten in Vermont. Contracts for a reservoir at Birch Hill, Massachusetts, costing about $3,005,000 will be announced shortly.

Other works on the priority list are: Tully, Massachusetts, $759,000, of which $94,000 is for a penstock; Claremont, New Hampshire, $5,160,000; West Canaan, New Hampshire, $2,520,000, of which $280,000 is for power; North Springfield, Vermont, $2,018,000; Ludlow, Vermont, $2,200,000, of which $459,000 is for power; North Hartland, Vermont, $3,630,000; South Tunbridge, Vermont, $2,275,000; Gaysville, Vermont, $4,785,000, of which $705,000 is for power; Union Village, Vermont, $2,376,000, of which $432,000 is for power; and Victory, Vermont, $1,415,000 of which $392,000 is for power.

In addition to the new works given priority, army engineers recommend

"THIS BUCKET SURELY DIGS"

● Two Williams Buckets are owned by George Slade, General Contractor, Bridgeton, N. J. About the rehandler bucket used to load crushed stone and slag into trucks, he writes, "It is a marvelous rehandling bucket. Two to three dips and the truck is gone."

About his ½ yard digging bucket, he says, "When it comes to excavating ditches, cellars and pipe lines, this bucket surely digs. We don't believe better buckets are built."

Send for free bulletins. They explain the fast, powerful action and rugged strength which make Williams Buckets so profitable to their owners.

THE WELLMAN ENGINEERING CO. • 7002 Central Ave., Cleveland, Ohio

"Built to Last —and Move Dirt Fast"

WILLIAMS Buckets built by WELLMAN

For your convenience in writing to The Wellman Engineering Co., you will find a card bound in this issue.

What does Reliable Power mean to YOU?

When a contractor's power plant fails . . . and there is no rock coming from the crusher, or no material from a hot mix plant, the overhead of idle men takes all the profit out of a job.

Contractors need power that will take care of the job from start to finish—power that is instantly available and can be depended upon without any pampering. They want a power plant that is compact and readily transportable to the next location.

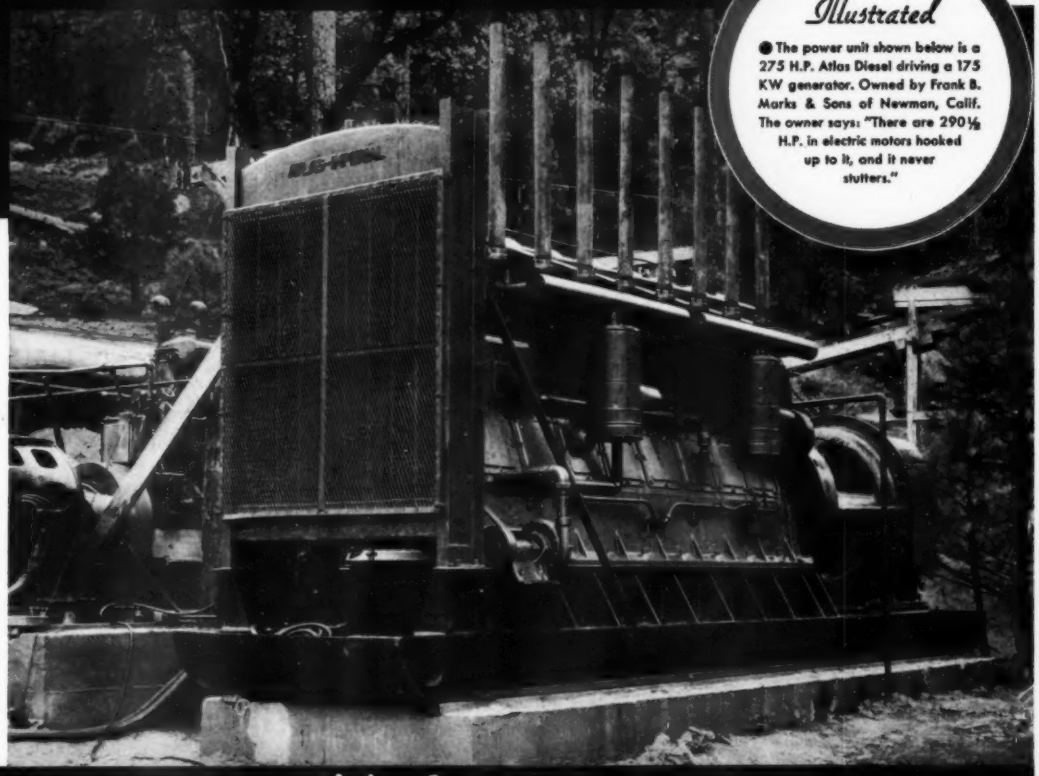
Atlas Diesels, such as the one pictured below, were proven in the construction industry more than ten years ago. They have earned enviable records all over the world for their stamina and dependability. Your choice of power may spell the difference between profit and loss on any job. Buy an Atlas Diesel and take no chances. Complete information sent on request . . . without obligation to you.

ATLAS IMPERIAL DIESEL ENGINE CO.

EASTERN DIVISION 115 BROAD STREET, NEW YORK, N. Y. SOUTHWESTERN DIVISION 5726 NAVIGATION BOULEVARD, HOUSTON, TEXAS
CENTRAL DIVISION 779 NORTH LA SALLE STREET, CHICAGO, ILLINOIS WESTERN DIVISION 1900 NINETEENTH AVENUE, OAKLAND, CALIFORNIA

Illustrated

● The power unit shown below is a 275 H.P. Atlas Diesel driving a 175 KW generator. Owned by Frank B. Marks & Sons of Newman, Calif. The owner says: "There are 290½ H.P. in electric motors hooked up to it, and it never stutters."



ATLAS *Imperial* DIESEL ENGINES

For your convenience in writing to Atlas Imperial Diesel Engine Co., you will find a card bound in this issue.

the following additional reservoirs: Easthampton, Massachusetts, on the Manhan River, $1,231,000; Fort Morrison, east branch of the North River, near Colrain, Massachusetts, $2,230,000; Otter Brook, New Hampshire, on Otter Brook above South Keene, $1,507,000; Upper Fifteen-Mile Falls, near the Vermont-New Hampshire border and Waterford, Vermont, and Pattenville, New Hampshire, $14,835,000; South Randolph, Vermont, near East Bethel, $1,670,000; Lyndonville, Vermont, $2,230,000.

WPA Summarizes Road Work

More than 450,000 miles of highways, roads and streets—the equivalent of 100 transcontinental highways and as many more across the country from north to south—have been built or improved by the Work Projects Administration since its inception in the summer of 1935.

Preliminary statistics just made public by the Work Projects Administration show that approximately one-seventh of all the highways, roads and streets in the United States have been built, reconstructed or improved by men taken off relief rolls for employment on the Federal Works Program. In other words, for every ten miles you drive, an average of one and one-half miles have been built or improved by WPA's army of the erstwhile jobless.

In connection with this vast road-building program, a correspondingly large amount of appurtenant work also was performed during the period from July, 1935, through December 21, 1939, the period covered by the latest accomplishment figures on the WPA. This incidental work included construction of 56,000 bridges and the improvement of 37,000; construction of 675,000 new culverts, 40,000 miles of drainage ditch, installation of 2,700 miles of roadside drainage pipe, construction of 15,000 miles of sidewalks and paths, 1,500 miles of curbs, 4,000 miles of gutters, and 1,700 miles of guard rails and guard walls.

● **Construction on California's Prado Dam is well underway. This excellent air view shows fill placing operations at the left, and inlet tower and spillway construction activities at the right. (Spence Air Photo)**

WPA road builders also were busy on the more than 500 airports and landing fields constructed or improved under the Federal Works Program. In four and one-half years, WPA crews constructed 1,756,000 feet of new runways and improved an additional 372,000 feet. (Of this total 1,065,000 feet of new runways and 104,000 feet of those improved were of high type surface.)

Of the more than 400,000 miles of rural roads worked on by WPA workers, some 28,000 miles were of high type surface and 380,000 miles were of low type surface construction. Nearly 15,000 miles of the high type surface roads represented new construction; the remainder was improvement.

In the cities, out of 49,700 miles of new or improved streets, 11,145 miles of streets were new construction, of high type surface.

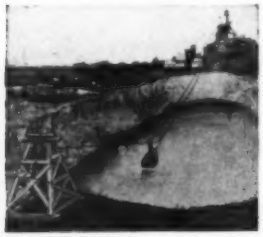
Start Continental Divide Tunnel

First contract for the construction of the Continental Divide tunnel, key feature of the Colorado-Big Thompson project, has been awarded by government officials.

This contract covers an 8,000-foot section at the east end of the tunnel near Estes Park, Colorado. After rejecting for the second time all bids for the construction of the entire tunnel, to be 13.1 miles in length, because they were too high, the government approved

IN DRY GROUND . . . OR UNDER WATER

SAUERMAN Power Drag Scraper moving 35 loads per hour over a 400 foot operating span.



SAUERMAN Cableway moving dry and wet gravel to top of screening plant for a few cents per cubic yard.

dig, haul & dump

. . . . for a few pennies a yard!

SAUERMAN Long Range Equipment digs and delivers economically because:

- Comparatively low cost installation.
- Materials handled are delivered in a straight line operation ANYWHERE up to 1500 feet.
- Eliminates all re-handling — three operations in one efficient movement.
- Ease of operation — machines effectively run with little practice.
- Entire machine and work handled by one man.
- Power cost and maintenance expense are exceedingly low.

Free engineering service and 30 years experience combine to help you with your problems — at no obligation of course. Write for our free catalog showing hundreds of typical installations.

SAUERMAN BROS., Inc.

474 S. CLINTON ST., CHICAGO, ILLINOIS

For your convenience in writing to Sauerman Bros., Inc., you will find a card bound in this issue.

KOEHRING *Team-Work* FOR LOWER COSTS

Dig it fast ▶
Load it fast ▶
Haul it fast ▶

All three are necessary — if you want profit on your dirt or rock excavation job. Now you can have all three—with Koehring Dumptors and Koehring Shovels. Dumptors are easily and quickly spotted and loaded, travel at high speed, forward or reverse, dump over the end of the fill, instantaneously by gravity. Fast operating Koehring Shovels complete the high speed cycle. Designed and built for tough rock excavation, they combine strength and speed for high production performance. Team up with Koehring equipment if you want job profit, from end to end.

KOEHRING COMPANY
MILWAUKEE • WISCONSIN

KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

For your convenience in writing to Koehring Co., you will find a card bound in this issue.

● Top: A Caterpillar tractor "snakes" a 60-foot cedar pole over a winding hogback trail during the erection of the Gila Powerline. Bottom: Breaking road over rocky terrain an International TD-18 lays cable assisted by a Caterpillar 60.

readvertisement of this short section.

The successful bid, which was lowest of 13 proposals, was submitted by the S. S. Magoffin Company, Inc., of Englewood, Colorado, in the amount of $471,123. Bids were received and opened by the Bureau of Reclamation.

The contract requires the excavation of more than 38,000 cubic yards of materials, the furnishing and installing of 900,000 pounds of permanent steel tunnel supports, and some other work. S. S. Magoffin Company, Inc., is allowed 430 days to complete the job after beginning work. In order to avoid delaying actual start of work, the tunnel portals were cleared in advance so drilling can be begun without delay.

The Continental Divide tunnel is to be 9.75 feet in diameter inside the lining, 69,023 feet or 13.1 miles in length, and lined throughout with concrete. Extending from the east end of Grand lake to Wind river, about five miles southwest of Estes park, the tunnel will carry water diverted from the upper Colorado river, on the Western Slope of the Continental Divide, to the headwaters of the Big Thompson river for use in supplementing irrigation supplies for 615,000 acres on the Eastern Slope in northeastern Colorado.

Erect Gila Power Line

By Joseph C. Coyle

Another step in the development of the Gila Project, near Yuma, Arizona, has been made. On March 12, Dwight Chapin, of Lincoln, Nebraska, "sagged" the last span of the 120-mile power line which will deliver current from Parker dam to the first pumping plant on the project, at the lower end of the seventeen mile gravity canal, heading at Imperial dam, on the Colorado river.

The plant, to be started soon, will lift water 52 feet to a portion of Yuma mesa. There were plenty of ups and downs along the route of the power line —precipitous mountains and yawning chasms. However, with a winch on every truck and tractor, the contractor's crew came through well ahead of their date with the Reclamation Bureau.

In some of the rougher going, where blasting was required to hole in the big 60 feet poles, and where many of them had to be winched up steep mountain sides, the work was sometimes slowed down to one structure a day. Tractors climbed by devious ways to the crest of the slopes, while the other men brought up a light line by hand. A winch cable, attached to this line, was then used to winch the poles up. Sometimes the tractor dragged them along narrow hogbacks, so crooked a sidewinder would develop a backache trying to crawl them. Now and then the pole slewed and rolled around the hillside at right angles to the cat, while the two-man crew sat tense and waited for it to come to rest. Then the skinner would kick his "cat" in the ribs and skillfully snake the sixty foot cedar back on the crest. On smoother terrain progress was rapid. Holes were bored with a Highway earth boring machine, mounted on a F. W. D. truck, and the poles set with a standard derrick. These poles are sunk in the ground nine feet, and are creosoted from the bottom to a point 18 inches above ground. The surface of the pole is pricked to allow deeper penetration of creosote and thus thwart termites. The remainder of the poles and cross arms are untreated.

Most of the cross arms were raised with insulators attached, using a 60 foot boom of pipe, with a pulley at the peak, and guyed to the steel deck of a Dart truck back of the cab. Two rolls of cable in special welded racks behind the cab aided in steadying the truck. A hoist cable from a Tulsa winch,

small TRAILERS too ··· embody ROGERS

time-proven fundamental features of design which have been tested under all kinds of most-severe service.

In *any* Rogers Trailer you obtain the maximum in proven construction, in ease of control, in safety and in all 'round value.

EXPERIENCE • built it •
PERFORMANCE • sold it •

ROGERS BROTHERS CORPORATION
136 ORCHARD ST. • ALBION, PA.

For your convenience in writing to Rogers Brothers Corporation, you will find a card bound in this issue.

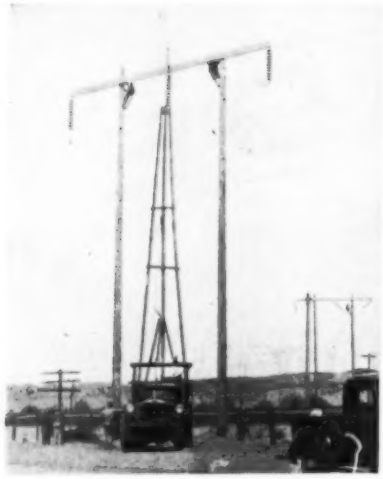
INCREASE *your* Dragline Output *with a* RED ARCH BUCKET

The extra pay load of every cycle gives you extra profits on every job. Get a Red Arch dragline bucket *(equipped with the new Red Arch chain)* and convince yourself that these buckets are better shaped to dig faster, are lighter to save more of your power for dirt-moving, are better balanced to carry higher heaps, are smoother flared and unobstructed to dump faster, and are strong and sturdy to stand up with less time-out. Try Red Arch. You save on maintenance and increase output — *that means more profit for you!*

Bucyrus·Erie

SOUTH MILWAUKEE, WISCONSIN

For your convenience in writing to Bucyrus-Erie Co., you will find a card bound in this issue.



● Equipped with a 60-foot boom this Dart truck places a cable tower cross arm.

driven by the truck motor, passed up over the pulley and was used in hoisting and holding the double cross arm while a man at either pole, and others on the ground with tag lines, guided it into place. At a railway and highway crossing two guard poles, with pulleys attached were used to keep lines and cables clear of traffic. At this point the cables were drawn through with hand lines till clear, then by tractors.

Ordinarily cable was wound from reels on the usual trailers, pulled by tractors. An International TD-18, fitted with Emsco bulldozer, made a road, nudging cactus and mesquite aside and shoving dirt into arroyos—some as much as 100 feet deep—to make way for the advance. The International also pulled a reel, except when filling a difficult wash. The reel was then detached temporarily. Sometimes the tractor made a way down into an arroyo and out again, while the cables were brought across by hand lines. Slack was taken up by winch lines to a truck or tractor. Cable rolls were handled with a 20-foot pipe boom on an F.W.D. truck, with Tulsa winch behind the cab.

The lines were "sagged" by a chart furnished by the Bureau, using a Coffin hoist to obtain close adjustment, according to the length of span and the temperature at whatever time of day the work was being done. Sag was checked by a transit on the pole at the elevation of correct sag. Length of span varied, but averaged eight structures per mile. Work started on the line just before Christmas, with a camp at Parker. Other camps were established at Quartzite, Bouse and Yuma. An average of 125 men were employed, working one shift. Thirty-five trucks were used in all phases of the work, 20 Internationals, 10 Fords, 3 F.W.D. and two Darts. Tractors on the job included an International TD-18 and a TD-40 used in stringing cable. Several Caterpillars were used for various purposes. On smooth terrain one line of cable was unrolled from the big Dart truck which raised the cross-arms. Mr. Chapin supervised the work himself, and Leslie Alexander was inspector for the Reclamation Bureau.

North Dakota to Vote on Diversion

By Bethune Jones

A spreading trend toward state constitutional amendments outlawing highway fund diversion is seen in the addition of North Dakota to the list of states voting on such amendments this year.

North Dakota's secretary of state has announced a referendum will be conducted June 25. Initiative petitions filed by the North Dakota county commissioners association, and other civic and highway taxpayer groups, were reported to have had more than 34,000 signatures, 70 per cent more than needed.

Although the 1939 North Dakota Legislature passed a statute prohibiting highway fund diversion, the new move for a constitutional amendment, if ratified by the voters in June, will give North Dakota's highway funds permanent protection, similar to that now provided in California, Missouri, Colorado, Michigan, Kansas, Minnesota and New Hampshire.

Besides the North Dakota vote in June, three other states, Idaho, Nevada and South Dakota, will vote on anti-diversion amendments next November. Legislatures of two other states, Iowa and Wisconsin, have taken initial steps for passage of similar amendments, but constitutional procedure in those states requires passage by two successive legislatures before amendments are presented to the voters for ratification. The proposed amendments in these two states are scheduled for presentation to their legislatures for the second time next winter.

Approve Nebraska Project

Presidential approval of the Mirage Flats project in Nebraska under the Great Plains "relief" irrigation program has been announced by government sources.

The project is estimated to cost $2,560,000 and will serve 12,000 acres on the north bank of the Niobrara River about 11 miles south of Hay Springs, Nebraska.

Construction will be undertaken by the Bureau of Reclamation as soon as cooperating agencies in the Department of Agriculture have obtained the requisite control of excess lands in the project area and have arranged for the repayment of reimbursable construction costs and for operation and maintenance of the project works.

The Bureau of Reclamation estimates that water users will be able to repay $985,000 over a period of 40 years in addition to carrying the costs of operation and maintenance. Remainder of the costs will be made up of expenditures by the Work Projects Administration largely for relief labor and expenditures in resettlement. The reimbursable expenditures will be made from a special appropriation of $5,000,000 made last year for construction, in addition to labor and materials to be supplied by the WPA, of water conservation and utilization projects in the Great Plains and the arid and semi-arid areas.

This project is located in an area which has been dry farm for half a century but where crop losses have been

BETTER rehandling BUCKETS are being built . . .

BECAUSE of the exceptional ability of an Owen to get capacity grabs in shallow materials, the rapid dumping action of the specially curved shells and its quick clean-up ability, satisfied Owen operators all over the world join us in saying, "Better rehandling Buckets are being built and Owen is Building them."

The OWEN BUCKET Co. 6095 BREAKWATER AVE. CLEVELAND, OHIO BRANCHES: New York, Philadelphia, Chicago, Berkeley, Calif.

AND OWEN is BUILDING them

For your convenience in writing to The Owen Bucket Co., you will find a card bound in this issue.

More working hours for your shovels

HOW MUCH IS "HOW MUCH"?

Your "quotation" from Westinghouse includes more than a piece of apparatus. It covers intimate engineering knowledge of your industry—necessary to design equipment to meet your needs. And it embraces accurate application experience to enable you to obtain the greatest possible return from your investment.

Tune in "Musical Americana," NBC Blue Network, every Thursday evening.

WESTINGHOUSE BUILDS TOUGHNESS AND ACCESSIBILITY INTO SHOVEL MOTORS

IDLE SHOVELS cost you money. To minimize this loss, insist on Westinghouse electrical equipment . . . with motors that have the extra stamina to run and run and run. And when maintenance *is* necessary, ready accessibility makes service easy and inexpensive. Result —more "working hours" to move the ore.

You will find Westinghouse an able partner in solving any electrical mining problem. Matching equipment to the job is a Westinghouse specialty, developed out of long, practical experience in designing and building all types of mining apparatus. Thus, from linestarter or floodlight to Ignitron rectifier and complete switchgear . . .Westinghouse equipment "has what it takes."

Call on your local office to assist you in meeting any electrical need. You can count on Westinghouse experience to help you move the ore more profitably.

WESTINGHOUSE ELECTRIC & MANUFACTURING CO.
EAST PITTSBURGH, PENNSYLVANIA

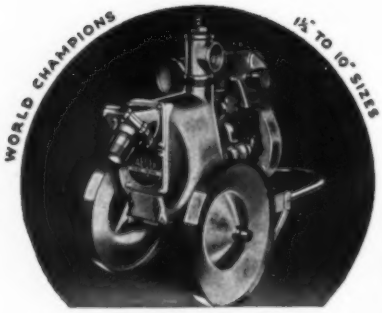
OUTSIDE THE UNITED STATES AND CANADA: THE WESTINGHOUSE ELECTRIC INTERNATIONAL COMPANY, 150 BROADWAY, NEW YORK, N. Y., U. S. A.

J-94304

Westinghouse

ELECTRICAL PARTNER OF THE MINING INDUSTRY

W WESTINGHOUSE ELECTRIC



Only JAEGER Pumps Have All These Features

- **JAEGER PRIMING JET** — Up to 5 times faster prime and re-prime — no adjustments, no need to "gun" engine.
- **POSITIVE RECIRCULATION CUT-OFF** — controlled by flow, not pressure.
- **ACCESSIBLE SEAL** — outlasts the impeller.
- **PATENTED SELF-CLEANING SHELL.**
- **EVERY PUMP FACTORY TESTED** for high capacity and pressure.
- **COMPLETE RANGE OF SIZES, TYPES** — 3,000 to 220,000 g.p.h.

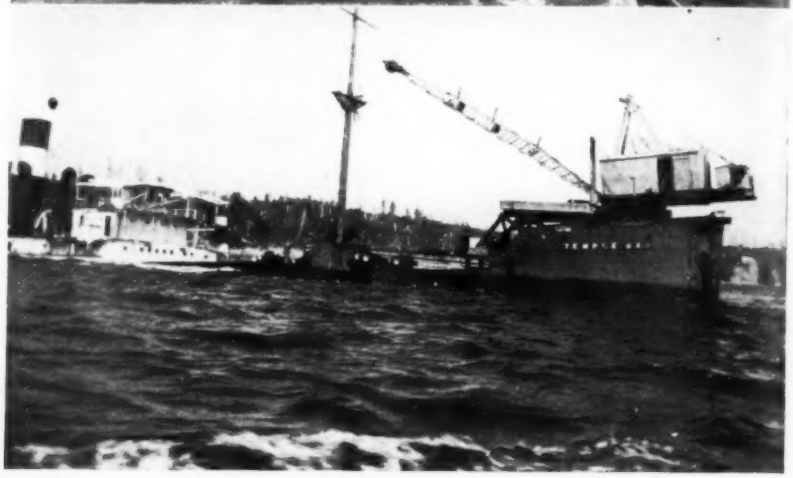
Send Today for Latest Catalog and Prices.

THE JAEGER MACHINE CO
553 Dublin Ave., Columbus, Ohio

Drill
for MORE PROFIT
with

modern Bucyrus-Erie water well drills. Whether you're drilling 100 foot wells or 4,000 foot wells, let a Bucyrus-Erie drill reduce your drilling costs and increase your profit. There is a size to fill your every need and requirement. Investigate, write for further information today.

BUCYRUS-ERIE CO.
SOUTH MILWAUKEE, WIS., U. S. A.



● **Perched on the prow of the wrecked "Temple Bar" a Bucyrus-Erie 50-B salvages the vessel's fittings and cargo. Note platform on barge used to float dragline to the wreck.**

heavy in dry years. Irrigation works were partially built by the farmers at one time, but failed owing to poor construction and lack of storage facilities. Most of the land holdings are in tracts of 160 acres or less.

The plan is to construct a diversion dam on the Niobrara River at the upper end of the project, about 15 miles of main canal, and a system of laterals and farm ditches. An earth and rock-filled dam will be built about nine miles above the diversion dam to store 30,000 acre-feet of water. Construction also will include rough land levelling.

Dragline Salvages Boat's Cargo

An unusual dragline job was undertaken recently, when Morrison-Knudsen of Boise, Idaho, reclaimed the cargo of a sunken steamer with a Bucyrus-Erie 50-B equipped with an electric magnet.

The ship was the "Temple Bar," of English registry, enroute from Florida to Japan with a cargo of 8,000 tons of scrap iron. Coming into Vancouver, B. C., to refuel, the steamer struck a rock and sank in fifty feet of water at a point two miles south of LaPush, Washington.

After purchasing the "Temple Bar" from an insurance company, Morrison-Knudsen mounted the Bucyrus-Erie 50-B on a sled at Portland, Oregon, and towed it to the scene of the wreck.

At low tide the steamer's deck was level with the water, which made it possible to skid the dragline from a scow to the prow of the wrecked ship which was about 10 feet above the deck.

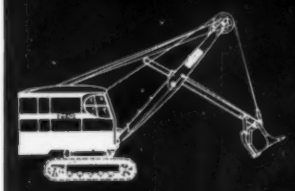
At this point a steel frame on skids was built directly in front of the machine. This frame supported the dragline over the deck as it removed the vessel's superstructure, winches, booms, masts and funnels.

After salvaging this material, a 5-ton electric magnet with a lifting capacity of 15 tons was swung by the dragline into the hold to pick up the scrap iron. An orange peel bucket was also used to remove some of the cargo. Scows of 1,000 ton capacity were employed to haul the scrap iron to Seattle.

"Slim" DeLong supervised this unusual job for Morrison-Knudsen Company and C. S. Messenger operated the 50-B.

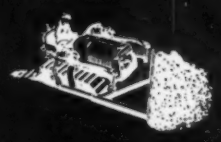
For your convenience in writing to the advertisers on this page, you will find a card bound in this issue.

Where to Buy BUCYRUS ERIE and BUCYRUS MONIGHAN *Products*



For Shovels, Draglines, Cranes, Clamshells, Skimmers, and Dragshovels 'Phone or Write the Nearest Dealer or Branch Office Listed Below.

For Large Shovels and Draglines, Walking Draglines, Bucyrus-Ruth Excavators, Blast-Hole, Prospecting, Oil Well, and Water Well Drills, 'Phone or Write the Nearest Bucyrus-Erie Branch Office Indicated Below with an ✻.



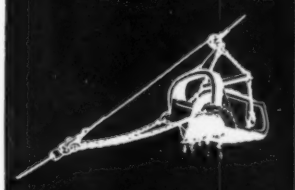
ALASKA: (See Washington, Seattle).
ARIZONA, PHOENIX: Crawford Tractor Co., 815 E. Jefferson St.
ARKANSAS, LITTLE ROCK: Lyons Machinery Company.
CALIFORNIA, LOS ANGELES: Crook Company, 2900 Santa Fe Avenue, Phone Kimball 5137.
✻SAN FRANCISCO: Bucyrus-Erie Company, 390 Bayshore Blvd. Phone Atwater 2341.
OAKLAND: Industrial Equipment Co., Outer Harbor.
COLORADO, DENVER: Ray Corson Machinery Co., 1646 Wazee Street.
CONNECTICUT, NEW HAVEN: The W. I. Clark Co., 1811 Dixwell Ave.
FLORIDA, JACKSONVILLE: Quinn R. Barton, Inc., 1305 W. Forsyth St.
✻GEORGIA, ATLANTA: Bucyrus-Erie Co., 1508 William-Oliver Bldg. Phone Jackson 1545.
ATLANTA: R. S. Armstrong & Bro. Co., 676 Marietta. Phone Jackson 2010.
IDAHO, BOISE: The Intermountain Equipment Co., Broadway at Myrtle St. Phone 171.
✻ILLINOIS, CHICAGO: Bucyrus-Erie Company, 1312 Bankers Bldg., 105 W. Adams Street. Phone Franklin 5321.
CHICAGO: Great Lakes Supply Corp., 824 W. 36th St.
INDIANA, INDIANAPOLIS: A. F. Deaney, 719-721 N. Pine St.
IOWA, CEDAR RAPIDS: James W. Bell, 916—16th N. E.
KANSAS, PITTSBURG: Bucyrus-Erie Co., 209 East 4th St. Phone 164.
KENTUCKY, LOUISVILLE: Brandeis Machinery & Supply Co., Brook & Warnock Sts. Phone Magnolia 6600.
MAINE, PORTLAND: Maine Truck-Tractor Co., 158 Veranda St.
MARYLAND, BALTIMORE: Stuart M. Christhilf & Co., 205 Snow Bldg. Phone Calvert 4310.
✻MASSACHUSETTS, BOSTON: Bucyrus-Erie Company, 240 N. Beacon St. Phone Stadium 3152.
MICHIGAN, DETROIT: H. E. Mensch, 424 Book Bldg.
MINNESOTA, CROOKSTON: Wm. H. Ziegler Co., Inc., 1115 So. Main St.
DULUTH: Wm. H. Ziegler Co., Inc., 304 Lake Ave., So. Phone Melrose 681.
MINNEAPOLIS: Wm. H. Ziegler Co., Inc., 2331 University Ave., S. E. Phone Gladstone 7971.
MISSISSIPPI, JACKSON: Mississippi Road Supply Co., Telephones: Long Distance 9906, Local 3676.
✻MISSOURI, KANSAS CITY: Bucyrus-Erie Company, 1007 Fairfax Bldg. Phone Harrison 4811.
✻ST. LOUIS: Bucyrus-Erie Company, 818 Olive St.—Suite 906. Telephone Chestnut 1354.
MONTANA, MISSOULA: Westmont Tractor & Equip. Co.
NEBRASKA, OMAHA: Cardinal Supply & Mfg. Co., Sunderland Bldg.
OMAHA: Fuchs Mchy. & Supply Co., 1102 Farnam Street.
✻NEW JERSEY, ENGLEWOOD: Bucyrus-Erie Company, 214-216 South Dean Street. Phone 3-6727.
NEW MEXICO, ALBUQUERQUE: R. L. Harrison Co., Inc., 209 N. 4th Street.
✻NEW YORK, NEW YORK: Bucyrus-Erie Company, 30 Rockefeller Plaza, Room 3627. Phone Columbus 5-4395.
ALBANY: Contractors Sales Co., Inc., P. O. Box 949.
MINEOLA: H. O. Penn Machy. Co.
NEW YORK: H. O. Penn Machy. Co., Inc., 140th St. and East River.
POUGHKEEPSIE: H. O. Penn Machy. Co.
✻SYRACUSE: Bucyrus-Erie Company, 303 Draper Ave. Phone 6-1078.
NORTH CAROLINA, GREENSBORO: E. F. Craven Company.
OHIO, CINCINNATI: Bode-Finn Co., 1654 Central Avenue.
CLEVELAND: W. T. Walsh Equipment Co.
COLUMBUS: H. S. Robertson, Walhalla Rd. Phone Jefferson 3242.
ZANESVILLE: Southern Ohio Equip. Co., 941-3 W. Main St.
OKLAHOMA, GUTHRIE: Clarence L. Boyd Co., Inc., 501 West Oklahoma.
OKLAHOMA CITY: Clarence L. Boyd Co., Inc., 17 S.W. Pottawatomie St.
OREGON, PORTLAND: Clyde Equipment Co., 17th & Thurman Streets. Phone Broadway 5561.
✻PENNSYLVANIA, PHILADELPHIA: Bucyrus-Erie Company, 821 Commercial Trust Bldg. Phone Rittenhouse 4281.
BRADFORD: Beckwith Mchy. Co., 361 Congress St.
HARRISBURG: Beckwith Machinery Co., 635 N. Cameron St. Phone 4-4064.
KINGSTON: Beckwith Machinery Co., 249 Market St.
✻PITTSBURGH: Bucyrus-Erie Co., 1502 Clark Bldg. Phone Atlantic 4815.
PITTSBURGH: Beckwith Machinery Co., 6550 Hamilton Ave. Phone Montrose 4300.
TENNESSEE, KNOXVILLE: Brooks Equipment & Mfg. Co., 408-10 Davenport Rd.
MEMPHIS: Road Builders Equipment Co., Third and Calhoun Sts.
TEXAS, DALLAS; E. B. Chambers, 1806 Tower Petroleum Bldg. Phone 2-2943.
ABILENE: R. B. George Machinery Co.
DALLAS: R. B. George Machinery Co., 1135 S. Lamar St.
EL PASO: Tri-State Equipment Co., 500 E. Overland Ave.
HOUSTON: Gulf Tractor & Equip. Co., 3100 Polk Ave.
PECOS: Tri-State Equipment Co.
TYLER: R. B. George Machinery Co.
UTAH, SALT LAKE CITY: The Lang Co., 267 W. First St.
VERMONT, BARRE: Reynolds & Son, Inc.
VIRGINIA, RICHMOND: Virginia Tractor Co., Inc., 1628 W. Main St.
WASHINGTON, SEATTLE: Clyde Equipment Co., 3410 First Ave., South.
✻SEATTLE: Bucyrus-Erie Co., 3408 First Ave., So. Phone Main 6424.
SEATTLE (for Alaska): Northern Commercial Co., 419 Colman Bldg.
SPOKANE: Construction Equipment Co., 1118 Ide Ave.
WEST VIRGINIA, CLARKSBURG: General Equip. Co., Inc., 414 N. Fourth St.
HUNTINGTON: Chas. S. Porter Supply Co., 424 Fourth Ave.
WISCONSIN, MILWAUKEE: W. L. Hartley, 8021 Woodland Ave., Wauwatosa, Wis.

Canada

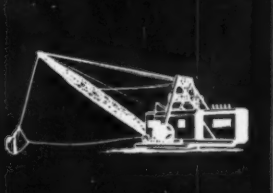
BRITISH COLUMBIA, VANCOUVER: Finning Tractor and Equip. Co.
MANITOBA, WINNIPEG: Kipp-Kelly, Ltd., 68 Higgins Ave.
ONTARIO, TORONTO: F. H. Hopkins & Co., Ltd., Commerce & Transportation Building.
QUEBEC, MONTREAL: F. H. Hopkins & Co., Ltd., 340 Canada Cement Bldg., Phillips Square. Phone Plateau 1136.

For Bucyrus-Erie Tractor Equipment — Bulldozers, Bullgraders, Hydraulic and Cable-Controlled Scrapers, Rippers, Tamping Rollers and Power Control Units See Your

International Industrial Power Dealer

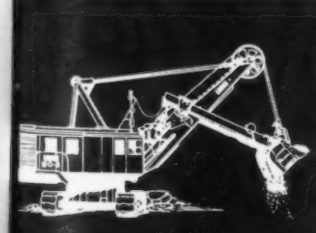


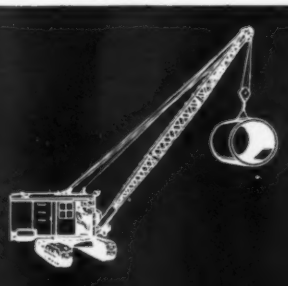
You can choose a modern Bucyrus-Erie and be sure of getting performance exactly suited to your needs. In 60 years Bucyrus-Erie has built over 28,000 machines for the excavating, drilling and material-handling field. With sales and service representation in all principal countries of the world, Bucyrus-Erie has a breadth of experience that is added assurance of the performance you want.

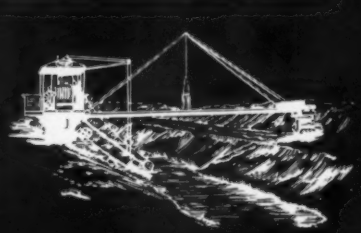


Bucyrus-Erie

GENERAL OFFICES: SOUTH MILWAUKEE WISCONSIN U. S. A.







NOT in the *Contract*

Shovelrunner Ike had been presented with a flask of rare old Scotch whiskey. He was walking briskly along the road toward camp, when along came a car which he did not sidestep quite in time. It threw him down and hurt him badly. He got up and limped down the road. Suddenly he noticed that something warm and wet was trickling down his leg. "Oh, Lord," he groaned, "I hope that's blood!"

"I represent the Mountain Wool Company, ma'am. Would you be interested in some coarse yarns?"

"Gosh, yes, tell me a couple."

The drunk hailed a cab and fell into the back seat.

"Shay, driver," he ordered, "drive me aroun' the block a hundred timesh."

The driver was startled—but he obliged just the same. Around and around the block they went. And on the sixty-fifth trip, the stew leaned over to the driver.

"Step on it, buddy," he hiccoughed, "I'm in a hurry."

A young widow was entertaining some friends at a bridge party and was greatly embarrassed when the bell rang and her six-year-old son answering the door, called out: "Maw, the insurance man is here again. Do you want to pay him or shall I go out to play?"

A shy little maiden from Loa
Got caught in the coils of a boa:
The snake squeezed and squeezed
And the maid not displeased,
Cried, "Go on and do it Samoa!"

A wealthy client insured her valuable wardrobe while travelling in Europe. Upon reaching London she found an article missing and immediately cabled her broker in New York, "Gown lifted in London."

Her broker replied, after due deliberation, "What do you think our policy covers?"

Clerk: "These are satin bloomers."

Girl. "Well I want some that have never been sat in before."

"Oh, your credit is okay with the company, Mr. Van Pelts—
I'm the one who doesn't trust you!"

Seen in the Papers!

The light wives and beer issue is expected to poll a record vote at the next local election.—**Corliss (Kan.) Globe.**

The ladies of the Aid Society are interested in anything you can spare around the house, an old pair of trousers, a vest, even an old coot would be welcome.—**Loma (Cal.) Globe.**

One can peek in most any evening on this home-loving young actress and find her cuddled up in an easy chair with a good boob before a crackling log fire.—**Hollywood (Cal.) Citizen-News.**

Orange juice and prune juice, strained and unsweetened, should be fed infants regularly because of essential vitamins, and mothers should without fail start beaning their babies at the age of six months.—**St. Louis (Mo.) Post-Dispatch.**

Mother: Have a good time at the dance, dear, and be a good girl.

Daughter: Make up your mind, mother.

A traveling salesman, having missed a bus, found himself with two hours to spend in Brushville. He approached a native.

"Got a picture show here?"

"No."

"A poolroom, or library?"

"No."

"Well, how on earth do you amuse yourselves?"

"We go down to the grocery store in the evenings and watch the bacon slicer work."

High heels must have been invented by a woman who had been kissed on the forehead.

Two Negro maids bought new hats. Liza was determined to wear hers to the Sunday service, but Mandy remonstrated, saying it was going to rain, and declared she'd save hers.

Liza, however, wore hers and, as Mandy predicted, it did rain. As they left the church, Liza gathered up her skirts and pulled them over the hat to protect it.

"Land's sakes," exclaimed Mandy. "It's puffectly outrageous foh yo' all to 'pose your anatomy dataway, Liza, and on Sunday, too!"

"Maybe so," replied Liza, "but dat 'natomy am 40 years old while dis hat am brand new."

Combination

work for you!

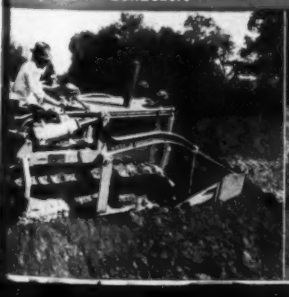
You can't beat the combination offered you by Bucyrus-Erie tractor equipment and International TracTracTors. When you buy this combination, you get equipment with a backing second to none in the dirt-moving industry . . . the backing afforded by the engineering, manufacturing, and sales facilities of both International Harvester Company, the world's leading builder of tractors, and Bucyrus-Erie Company, the world's leading builder of excavating machinery.

If you are trying to get the lowest cost per yard in dirt-moving and the lowest cost per hour on tractor operation, look into the benefits of this combination. Consult your International Industrial Power dealer. Discuss your problems with him. Give him a chance to show you how Bucyrus-Erie and International can help you get big output at low cost . . . Bucyrus-Erie Company, South Milwaukee, Wisconsin, U.S.A.

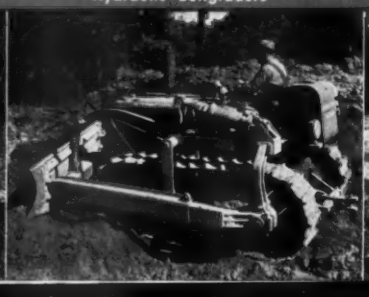
Bucyrus-Erie tractor equipment is the only fully developed line of tractor equipment sold only through International Industrial Power dealers.

P65

Hydraulic Bulldozers



Hydraulic Bullgraders



Scraper-Bullgrader Dual Units

2-Wheel back-dump Scrapers

Civilization Comes to Coachella

(*Continued from page 333*)

are the shifting sands of the All-American Canal farther south. At least 25% of the soil is made up of fine clays and silts. Up in the foothills beyond irrigable land the salt and alkali shows up on the surface in so nearly a pure state that it resembles a fresh snowfall. An artesian well near the job office at Frink is so salty that the water is unfit to drink even though the state laboratory shows a perfect test.

One of the features of the soil in the irrigated land of Southern California, however, is its ability to grow good crops with an abnormally high percent of alkali and salt present. The tightness of the soil indicates that no clay blanket will be needed on the floor of the canal for the tempering or "running in" process as was needed on the main branch of the All-American, according to Superintendent C. A. Colon, whose authority is unquestioned on soils, excavation equipment and "sand fleas."

In the matter of soils, Superintendent Colon digs sand, talks sand, dreams sand, and eats a goodly part of sand when a desert wind is blowing.

In the matter of excavation equipment, C. A. Colon has been a rigger of note for years, erecting equipment for Lewis-Chambers in the mid-west. The 12 yard bucket being used on the Monighan was designed by him, and his remarks about the matter would lead the novice to believe the design was made largely by instinct.

"Oh, **that** damned thing," said Superintendent Colon tersely as he jerked a stubby finger in the general direction of the bucket. "That's mine. I made it. How thick's the steel? Oh, it varies. Well, dammit, if you want to know, it varies from a half inch to an inch and a half. How come there's only four teeth in the bucket? . . . Hell, I don't know . . . we started putting teeth on the damned thing and four seemed about right. What's that? Well, son, the damned thing's working, ain't it? Now what other damn fool question you want to ask?"

One didn't need to ask. One realized he had something, and a lot of something, on the ball.

In the matter of "sand fleas," Colon stripped a Ford down to the chassis, put on oversized tires, hauled fuel over terrain almost sandy enough to stick a tractor, and kept his big machinery running. The "sand flea" is the goods. It works.

Job Receives Flood Test

Work had hardly begun on the job when the worst rainstorm of thirty years fell on the desert in September, 1939. Six inches of rain fell in nine hours. The normally dry washes which crossed the canal every mile or so became raging torrents, and the hydraulic studies made by the Bureau of Reclamation at the time set a rainfall precedent which convinced their officials that the wash channels leading over the siphon structures would have to be enlarged to accommodate similar abnormal rains. In order to widen the wash channels, the designing engineers of the Bureau increased the length of the siphon structures of the canal, which set in general at right angles to the washes.

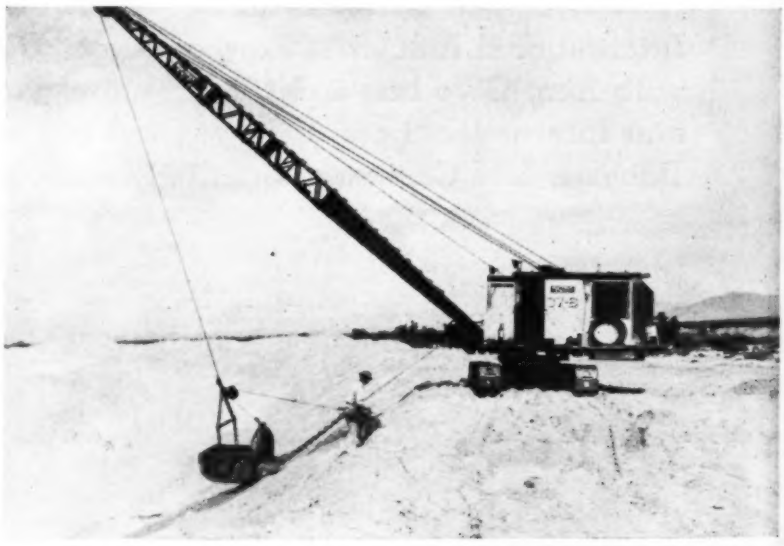
The completed revision showed a 34% net increase in the opening of the washes. In order to accomplish this enlargement, the total length of all the siphon structures was increased from the original length of 4327 feet to 5797 feet between the headwalls.

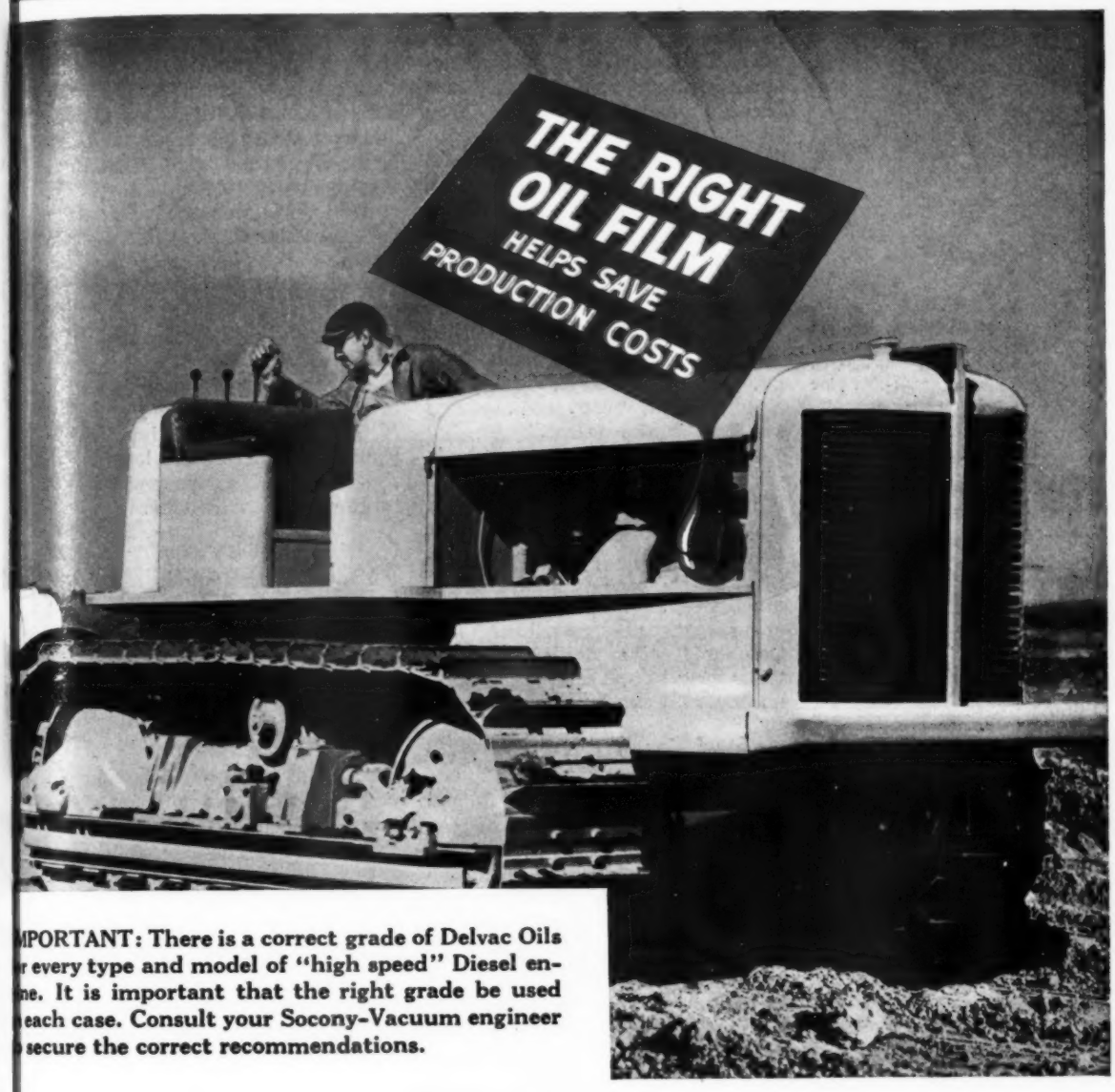
In this manner the drainage water coming from the foothills can adequately drain as much as 77,000 acres per wash and carry the drainage water over the siphon structures, beyond the Coachella Canal, and down to lower lying country. Dike systems are built by a Caterpillar 80 bulldozer to drain the runoff water over the concrete siphon structures. These dikes are reinforced at erosion points with rock riprap quarried in one of the nearby mountains. On several of the structures, automatic spillways will take excess runoff storm water through radial gates and empty the surplus out of the Coachella Canal. This is a wise flood provision.

R. Newton McDowell of Kansas City, Missouri, has the subcontract for furnishing the stone riprap. Stone is used in quarry run form in pieces varying in size from those passing a 5-inch screen to the ½ cubic yard size. It is a dull reddish brown stone of the massive igneous type common to this part of Southern California. A 1½ cubic yard Marion shovel is used to load and handle 400 yards of riprap per 8 hour day. This stone is hauled by a fleet of 8 Ford 4½ yard dump trucks to construction points along the 16 mile construc-

(*Continued on page 376*)

● **Bucyrus-Erie 37-B dresses a neat looking slope on the Coachella canal.**





MPORTANT: There is a correct grade of Delvac Oils r every type and model of "high speed" Diesel en- ne. It is important that the right grade be used each case. Consult your Socony-Vacuum engineer secure the correct recommendations.

Correct Lubrication

NEW LUBRICANTS ahead of new ds . . . developed in close coopera- with machine builders by famous ony-Vacuum laboratories.

HALF A MILLION CASE HISTORIES to de our engineers in recommending right use of these lubricants to earn rication Profits for you.

DISTRIBUTION throughout the world. The same high-quality lubricants available everywhere.

• • •

SOCONY-VACUUM OIL CO., INC.
Standard Oil of New York Division • White Star Division • Lubrite Division • Chicago Division • White Eagle Division • Wadhams Division • Magnolia Petroleum Company • General Petroleum Corporation of California

GARGOYLE
Lubricants

For your convenience in writing to Socony-Vacuum Oil Co., Inc., you will find a card bound in this issue.

● Close-up of the special coupling used on the 4-inch water line. This coupling enabled two men to hook up 1½ miles of 20-foot pipe sections in eight hours.

(*Continued from page 372*)

tion working front maintained at this time.

The pouring of concrete on a desert job usually poses the most perplexing kind of problems for even the oldest construction superintendents along the line. The Coachella job in this respect is certainly no exception to the rule, for the problems presented come one right after the other.

M. H. Hasler, the construction partner who builds the structures, has engaged boyish, genial B. F. Partain, young in years and old in experience, to solve those problems. Partain has been with the Hasler firm for two years and in the construction game for more than a decade.

Water Problem Solved

He finds, for instance, that when concrete is poured on the desert there is always the problem of securing the water necessary to mix and cure the concrete. On this job, it was such a problem that Mr. Partain had to buy 87,000 linear feet of 4-inch iron water pipe,—almost 17 miles! This line is run in from the work site to the Eastside Main of the Imperial Irrigation District, where three Worthington piston pumps force 100 gallons of water per minute into storage tanks. Booster stations are then used along the line. Connecting this immense length of pipe in 20 foot sections is no small task in itself, but Mr. Partain has shortened the task considerably by his own ingenuity. He has secured a fast coupling which works so satisfactorily that two men can hook up 1½ miles of leak-proof pipeline in 8 hours.

Monoliths in the siphon structures are small; the largest pours are only about 30 yards. Three Rex 1-yard pavers are used at intervals and a ¾-yard Northwest crane is used where the pours warrant. An average of 125 yards of Class A concrete is poured per 8 hour day. This amount, though small, is poured in a well planned, orderly, effective manner.

"The greatest thing I hope to do, next to keeping my crew happy," Mr. Partain said, "is to show a substantial profit on concrete out here in the desert."

Aggregate for the concrete is pit mined at a central plant near Frink, where it is graded, washed and stored until it is weighed out to the job. Sack cement is hauled from Riverside, California, 130 miles away. During the hot, blistering weather between June 1 and October 1 when desert temperatures soar to 130 degrees by day, no concrete can be poured at all.

Steel Concrete Forms Used

Wooden forms, which wear out rapidly on any concrete job and in addition warp badly in the desert, were replaced at once by Superintendent Partain with two sets of new special steel forms, which he estimates will last for the life of the job. So many of the siphon structures are similar that these steel forms can be used over and over again with no cost for upkeep. A Bay City truck crane is used to set and remove these forms. For structural excavation a Bucyrus-Erie 50-B machine is used. In general, this machine excavates 1800 cubic yards per 24 hour day, working under somewhat adverse conditions of restricted pay lines around the structures. A Caterpillar D-7 bulldozer maintains the finer grades and keeps loose earth ahead of the blade where the bucket of the 50-B machine can pick it up effectively.

Steel reinforcement is placed by subcontractor C. M. Hill. A Lorain 40 truck crane is used by Mr. Hill to unload the steel from railroad cars to his Niland steel yard and to place it in the canal near the work.

A central repair shop is maintained by Morrison-Knudsen and M. H. Hasler near Frink, where their headquarters are located. In this shop all the major repairs to large equipment is done.

Labor Prices

Labor on the job is restricted to a 40 hour week, but it is evident that superintendents and foremen are making a concerted effort to see that all of the 450 men on the project get the maximum allowable time. This job is notable in that the welfare and happiness of the crew is given as much consideration as any other single part of the job. Wage scales set forth by the Bureau of Reclamation follow for a few of the common classifications:

	Per hour
Carpenter	$1.12½
Cement finisher	1.00
Concrete mixer operator	.93
Grader operator	1.10
Laborer	.55
Oiler	.82

● Office headquarters of the Morrison-Knudsen-Hasler Coachella canal job at Frink. Note aggregate stock piles at left.

Crane, derrick & dragline operator	1.25
Shovel operator	1.37½
Tractor operator (under 50HP)	.80
Tractor operator (over 50HP)	1.00
Vibrator operator	.70

No camp is maintained at Frink for quarters and subsistence of the crew, since most of the men live in the surrounding desert towns, all of which have mushroomed under the impetus of this construction activity. A well arranged safety program has resulted in only a few minor injuries so far.

And that, at length, is the Morrison-Knudsen-Hasler job. It is a job which has its difficulties, but usually the experience of the men behind the work makes things run smoothly.

"Charlie Bradley is the best engineer I ever saw," says Superintendent Partain.

"Boy, I'm tellin' you," vowed C. A. Colon during the lunch hour, "that Mr. Hasler is the most cooperative man I ever worked with!"

They all greeted J. R. "Dick" Lawrence, the resident engineer of the Bureau of Reclamation, quite pleasantly.

So how in the world could you pick a fight on a job like that?

● Michigan truck shovel places a protective stone layer at the mouth of the intake tower.

Pennsylvania Flood Control Job

(Continued from page 341)

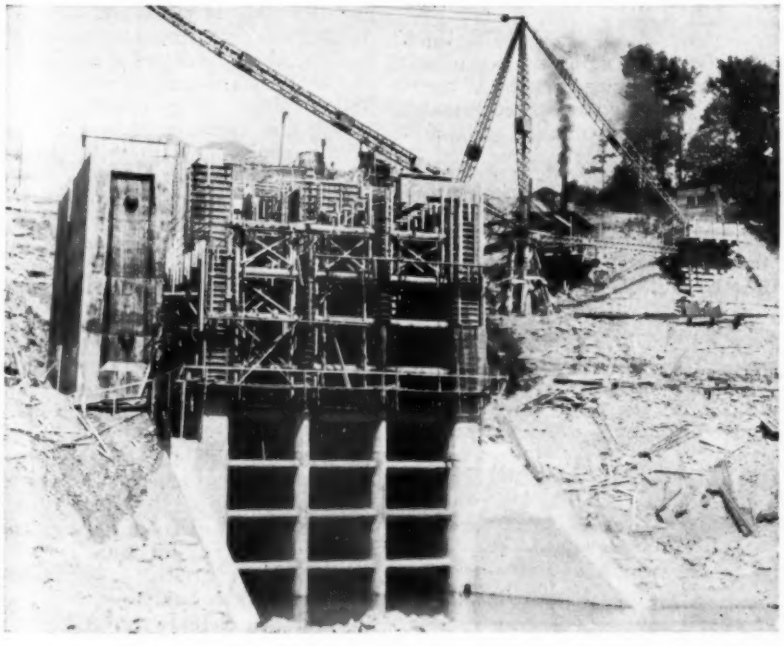
tor, rates the credit for overcoming this difficulty. He ordered the erection of a stiffleg derrick equipped with a 100 foot swinging boom on the right ledge of the basin. Next, two Multi Foote portable concrete mixers were moved in and situated so they could dump into a large wooden hopper on the ledge beneath them. The derrick was equipped with a 1-yard, bottom dump cement bucket to receive and lower the concrete, and action soon began.

All gravel and sand used on the project is transported over paved roads in trucks from an island pit about a mile distant. A Bucyrus-Erie 2-yard shovel and a Koehring ¾-yard dragline are employed in gravel excavation operations. A Caterpillar 60 tractor rigged as a bulldozer keeps the gravel pit floor shipshape.

Erection of Inlet Works

Inlet works were constructed at the same time the stilling basin was being excavated. Highest permanent structure of the project is the intake tower, a reinforced concrete structure about 140 feet high on a firm rock foundation.

● Construction view of the diversion tunnel intake tower showing the stiffleg derrick in action.



This tower is to be equipped with vertical, 17 ton lift gates, which will regulate the flow of water going into the three steel conduits. A 69'x40'x36½' steel reinforced stone and brick operating house will surmount the intake structure. This building will contain office quarters and equipment.

The total height of the intake works will be 185 feet and will call for a total of 16,000 cubic yards of concrete to complete its construction.

All equipment used on the job is kept in repair either in the field or in a repair shop located about ¼ mile north of the project. A portable Lincoln arc welding outfit is used to repair buckets, compressors, and other metal equipment needing on-the-job attention.

EDITOR'S NOTE: *On May 1 work on the Tionesta project was over 70% complete. The following work remained to be completed: placing of 900,000 cubic yards of earth from borrow into the dam embankment and 100,000 cubic yards of rock from the spillway for riprap on the upstream face of the dam. About 10,000 cubic yards of concrete lining was to be placed in the spillway along with the construction of the operating house on top of the intake tower.*

It is the intention of the Groves-Lundin Company to have all work completed by the close of the present working season.

New Equipment

(Continued from page 346)

tainer keeps the spray gun supplied with material.

Complete details and prices on this unit may be had by writing the manufacturer.

Reversible Wrenches

The Chicago Pneumatic Tool Company of New York has recently placed on the market two new types of reversible wrenches, one designated as No. 365-R and the other wrench as No. 375-R.

When writing to manufacturers please mention Excavating Engineer.

According to the manufacturer, these wrenches are particularly useful in refineries, railroad shops and for removing and applying staybolt caps, dome nuts, smoke box nuts, cylinder and valve chamber head nuts, front end nuts, washout plugs, structural steel work, cracking still work, shipbuilding work, etc.

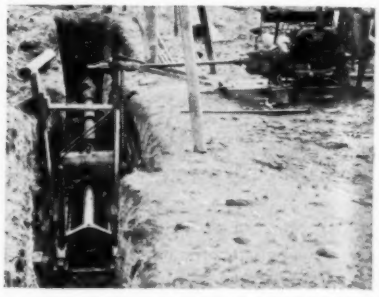
The No. 365-R reversible wrench employs a slow speed rotary motor. The wrench has no gears or resilient members in the driving unit, is light in weight and has a short overall length, according to the manufacturer.

With the exception of a larger capacity, the No. 375-R is practically the same throughout.

For further information, write the Chicago Pneumatic Tool Company, Chicago Pneumatic Building, 6 East 44th Street, New York, New York.

Boring Machine

The Young Engine Corporation, Canton, Ohio, has developed and placed on the market a boring machine, known as the Young Boring Machine, which installs



casings up to 36" diameter for water lines, gas and oil lines, sewers, conduits, etc., under highways and railroads or through embankments.

In operation, the machine is placed in the ditch with a 20/30 H.P. gasoline power unit set up on the bank at the side. The casing to be installed is attached to the driving head of the machine which is an 8"x13½" forged steel flange on the forward end of a rotating hollow sleeve. The combined rotating and forward thrust of the sleeve forces the pipe with cutter head into the embankment.

After the hollow driving sleeve has been advanced to its full extent, it is unflanged from the casing and returned to its starting position. Then an 8"x6' flanged extension joint is inserted between the rear end of the pipe and the driving sleeve. This operation is repeated until the total length of the inserted extension joints exceeds that of the next joint of casing. All the extension joints are then removed and the next section of pipe is welded or screwed to the preceding one, and the cycle of operations is continued. For further information write the above company, requesting bulletin E-15-E.

MATERIALS • METHODS • FACILITIES • EXPERIENCE

Some of the men who make Leschen Wire Rope. Average length of service of this group is over 35 years. They are not only skilled wire rope makers, but they train the younger men who are being brought into the organization from time to time.

"Leschen Quality" is the sum of many factors, of which the human element...the Leschen Organization, is an important one. It consists of the men who direct the company's policies, the engineers who design the ropes, and the skilled workmen who either actually make them or supervise each manufacturing process.

You can depend on "HERCULES" (Red-Strand) Wire Rope for safe and economical service, because its entire process of manufacture — from the selection of its material to the last inspection — is planned and double checked. Nothing is left to chance.

Your proving ground for wire rope is on the job, so why not measure the actual worth of "HERCULES" by the yardstick of performance? If there is a saving to be had, do you not want the benefit of it?

Round Strand — Flattened Strand

Preformed

In "HERCULES" there is a correct type and construction for every purpose

MADE ONLY BY

A. LESCHEN & SONS ROPE CO.

WIRE ROPE MAKERS — ESTABLISHED 1857

5909 KENNERLY AVENUE — ST. LOUIS, MISSOURI, U. S. A.

NEW YORK • • • 90 West Street
CHICAGO • • 810 W. Washington Blvd.
DENVER • • • 1554 Wazee Street

SAN FRANCISCO • • 520 Fourth Street
PORTLAND • • 914 N. W. 14th Avenue
SEATTLE • • 3410 First Avenue South

For your convenience in writing to A. Leschen & Sons Rope Co., you will find a card bound in this issue.

Trade notes

A number of new distributors in various parts of the country have recently been appointed by Bucyrus-Erie Company to handle the Bucyrus-Erie line of ⅜ to 2½-yard shovels, draglines, cranes, clamshells, dragshovels and skimmers.

Contractors Sales Company of Albany, New York, are new distributors for east-central New York State.

In the Mid-West, W. T. Walsh Equipment Co. of Cleveland, Ohio, have been appointed distributors for sixteen counties in northern and northeastern Ohio.

Southern Ohio Equipment Company, Zanesville, Ohio, are new distributors for twenty counties in east-central and southeastern Ohio.

In the Far West, new distributors have been appointed in three different territories: Crawford Tractor Company of Phoenix are the new dealers for the state of Arizona; The Lang Company of Salt Lake City are new dealers for the state of Utah; and Construction Equipment Company of Spokane, Washington, have been appointed distributors for eastern Washington and northern Idaho.

In appointing these new dealers, all of them well established with outstanding reputation for giving first-class service, Bucyrus-Erie has improved greatly its facilities for serving its friends in all the territories affected.

Armour Institute of Technology, Chicago, according to the annoncement by Dr. L. E. Grinter, vice-president and dean of the graduate division, will conduct a three-term Summer Graduate Institute for engineers, professional men, industrialists, and educators in engineering and science beginning with the summer of 1940. It is planned, according to Dr. Grinter, who is in charge of the Summer Institute beginning with this year, to invite scientists of great distinction to lecture each summer on modern developments in engineering and science.

R. G. LeTourneau, Inc., has recently added a new building to their Peoria plant. A week-long series of meetings dedicating the new addition was held with such distinguished speakers as ex-president Herbert Hoover and R. G. LeTourneau on the program.

The new building is 132x284, containing approximately 37,500 square feet. The building will be used for stockroom, warehouse, new metallurgical laboratory, and welding rod manufacturing.

Book reviews

When writing to manufacturers and publishers please mention Excavating Engineer.

James T. Mangan literally tears the lid off that great delusion—the "merit" of getting ahead in business, in his new book "The Knack of Selling Yourself." Containing information of interest to people in every walk of life, it presents the practical "get there" system of life as opposed to the theoretical "copy book rules" system which leaves us where we started.

Requests for this publication, other than those connected with a company, should be accompanied by check. Single copy $2.50. Mail your request to the Dartnell Corporation, 4660 Ravenswood Avenue, Chicago, Illinois.

Sanford-Day Iron Works, Inc., Knoxville, Tennessee, have recently published a new folder and data sheet, form No. 1255-K, on Sanford-Day Automatic Bottom Discharge Trailers. All interested parties may obtain their copy by contacting the above company specifying form No. 1255-K.

Two articles entitled "New International Gasoline Power Units" and "New Line of International Diesel Power Units" together with pamphlet A-50-DD, just off the press has been released by International Harvester Company, 180 North Michigan Avenue, Chicago, Illinois.

Your request for these should be addressed to the above company designating which article you desire.

A method of recording the surface texture of a road by means of offset printing has been devised by the road research laboratory of the British Department of Scientific and Industrial Research. Road Research Bulletin No. 3 describes the necessary equipment and technique. Priced at nine pence (18 cents) each, copies of this bulletin can be obtained from His Majesty's Stationery Office, London.

A general guide to the uses and properties of nickel and high nickel alloys is incorporated in a new illustrated booklet which has just been published by The International Nickel Company.

In a sixteen-page, pocket size edition, this new publication "Seven Minutes With Seven Metals," includes material on Nickel, Monel, Inconel, and associated alloys in both mill and clad forms. Space is also devoted to the properties and uses of the metals in cast form.

It is being distributed without charge by The International Nickel Company, 67 Wall Street, New York.

The Wood Preserving Corporation, Pittsburgh, Pennsylvania, has recently released a piece of product literature entitled "Pressure-Treated Highway Posts." This bulletin deals with the kinds of pressure-treated timber posts and their advantage, also touching on the subject of reflector buttons on creosoted posts.

FOR SALE

RATES: 60c per line—minimum charge $2.40. Repeat insertions with no change in copy—three insertions for the price of two. ¶ Display advertising in this section at published display advertising rates. ¶ Estimate 41 characters per line, counting all spaces and punctuation as one character each. Allow ten characters for box number for blind advertisements. If address given, counts same as advertising copy. ¶ Rates are net (no commission, no discount) and payable in advance of publication. Send your remittance with insertion order and copy. ¶ Closing date—15th of preceding month. Example—January issue closes December 15.

Address all box numbers c/o EXCAVATING ENGINEER . . . . . at South Milwaukee, Wisconsin

SMALL SHOVELS, CRANES AND DRAGLINES
Up to 2½ Cubic Yards

UNIVERSAL TRUCK CRANE — 28' boom. Waukesha 4-cylinder 4¼" x 6¼" engine. Mounted on Mack truck. Operating condition. Located Northern Ohio. Box 2496

BUCYRUS-ERIE Type B High Lift ¾-yard steam shovel. Operating condition. Located vicinity Boston. Box 2401

LIMA MODEL 801 70' boom Dragline. Waukesha Hesselman engine. 6-cylinder 6½"x7". New cylinder sleeves in engine. Electric starter. Three boom lights, flood light and rear light but light plant not included. Extra 150 gallon fuel tank. Three cubic yard Page RM bucket included. Machine excellent condition. Reasonably priced. Located central Illinois. Box 2524

FOR SALE. Account owner retiring from business. Bucyrus-Erie 10-B Gas Shovel. Electric starter. Good mechanical condition. Owner will sacrifice. Box 2506

BYERS MODEL 128 Gas Shovel, Back Hoe and 35' boom clamshell equipment with bucket. Good operating condition. Reasonable price. Located near Pittsburgh, Pa. Box 2495

10-B GAS SHOVEL. 14" cat treads. Electric starter. Battery lights. Hercules 6-cylinder 3⅜"x4¼" engine. Extensively field reconditioned. Located northern Texas. Box 2525

LORAIN MODEL 75-D 1½-yd. Diesel shovel. Cat D-11000 engine. Excellent condition. Only worked 8 months since factory reconditioned. Located central Wisconsin. Box 2523

LORAIN MODEL 55 1-yd. Gas shovel. Waukesha engine. Electric starter. Operating condition. Located western Wisconsin. Box 2522

BUCYRUS-ERIE 45-B—45' boom Dragline 2½ yd. drag bucket. Buda Diesel engine. Good operating condition. Located Louisiana. Box 2514

LORAIN-40 Gas Shovel. Electric starter. Waukesha engine. Located North Carolina. Box 2267

BUCYRUS-ERIE 43-B Gas shovel. 23' boom, 17' dipper handle, 1½-yd. dipper. Chain crowd. Electric starter. Wisconsin 6-cylinder 6"x7" Model E engine. Extensively repaired. Excellent shape. Located vicinity Boston. Box 2257

LORAIN MODEL 40 ¾-yard Gas Shovel. Excellent condition. Located Washington, D. C. Box 2520

NORTHWEST MODEL 105—45' boom dragline including ¾ yd. Omaha drag bucket. Operating condition. Located North Carolina. Box 2507

BUCYRUS-ERIE 43-B—2 cu. yd. Diesel Shovel. Electric lights. Buda engine. Electric starter. Long and wide cats. 35" treads. Extensively field reconditioned. Located Western Pennsylvania. Box 2484

OSGOOD-COMMANDER II Combination ¾-yd. shovel and 40' boom dragline, including drag bucket. Hercules 6-cylinder 4½"x4¾" engine. Good condition. Located California. Box 2481

BUCYRUS-ERIE HIGH LIFT 55-B Diesel Shovel. 35' boom. 22' dipper handle. 2-yd. dipper. Kohler light plant. Atlas 6-cylinder 6½" x 8½" engine. Good operating condition. Located Central New York state. Box 2501

NORTHWEST MODEL M. 45' boom Clamshell including 1¼ cubic yard Vaughn Basket Type Bucket. Wisconsin gas engine. Good operating condition. Located near St. Louis, Missouri. Box 2521

If You Do Not Find What You Want Listed—Write Us EXCAVATING engineer South Milwaukee, Wis.

BUCYRUS-ERIE B-2 1 yd. steam shovel. Operating condition. Located vicinity Detroit. Box 2308

LIMA MODEL 602—60' boom dragline including 1½ yd. AX drag bucket. Waukesha gas engine. Good mechanical and operating condition. Located Eastern Pennsylvania. Box 2508

BUCYRUS-ERIE 52-B—75' boom Dragline. Oversize cats. Atlas-Diesel engine. Good working condition. Located Nebraska. Box 2513

BUCYRUS-ERIE 1020 Gasoline 35' boom Clamshell and Dragline. Located San Francisco. Box 2407

BUCYRUS-ERIE GA-2 Gas-Air high lift shovel. 24' boom. 18'4" dipper handle. 1¼ yd. dipper. Waukesha 6¼"x8" 4 cylinder engine. Electric starter. Quantity spare parts included. Excellent condition. Located Eastern Pennsylvania. Box 2313

BUCYRUS-ERIE 42-B steam shovel, 1½-yard; standard boom. Exceptionally good condition. Also B-2 steam shovel, high lift. Equipped for dragline use. Located vicinity Kansas City. Box 2515

BUCYRUS-ERIE 41-B 1¼-yd. Steam Shovel. Boiler ASME and Massachusetts standards. Very good condition. Located Southern Ohio. Box 2537

BUCYRUS-ERIE 50-B—Steam combination 2-yard shovel and 75' boom clamshell and dragline. Located Pennsylvania. Box 2530

NORTHWEST No. 5. Combination 1¼-yd. Gas Shovel and 55' boom Dragline, including 1-yd. practically new ESCO drag bucket. Twin City 100 h.p. engine. Good running and operating condition. Located New Mexico. Box 2538

MARION MODEL 381 2 yd. shovel powered by Hesselman engine. Extensively repaired. Excellent condition. Available for demonstration. Located northwestern Pennsylvania. Box 2304

KEYSTONE MODEL 4 Gasoline dragshovel. Operating condition. Located western Pennsylvania. Box 2526

NORTHWEST-6—1½ yd. Shovel. Twin City Oil Engine. Operating condition. Located California. Box 2482

KOEHRING MODEL 1-A. Combination 40' boom crane and dragline. Gasoline. Wisconsin engine. Operating condition. Located near St. Louis. Box 2402

BUCYRUS-ERIE 32-B Gas Dragline. 45' boom. 26" cat treads. 1¼-yd. Page drag bucket. Wisconsin 6-cylinder 6" x 6" engine. Located Nebraska. Box 2500

LARGE SHOVELS, CRANES AND DRAGLINES
2½ Cubic Yards and Over

P&H MODEL 800. Diesel 2½-yd. shovel and 80' boom dragline. 2½-yd. Page RC drag bucket. 6-cylinder Atlas 9"x10½" engine. Completely overhauled recently. Ready for a season of hard work. Now working. Can be inspected. Located Eastern Pennsylvania. Box 2502

If You Do Not Find What You Want Listed—Write Us EXCAVATING engineer South Milwaukee, Wis.

5-W MONIGHAN Diesel Walking Dragline, Ward-Leonard Electric swing. 100' boom. Complete with 6-yard bucket and chains. Ready to work, priced to sell. Box 2518

MARION NO. 125 Steam shovel. 2¾-yard. 55 ft. boom, 36 ft. sticks. On cats. Light plant. Now working Central Missouri. Low price. Box 2529

MISCELLANEOUS EQUIPMENT

BUCYRUS-ERIE Scraper M-81—Single Cable Control. Capacity 7.2 cu. yd. Struck measure. 4-wheel 6 tires. Field reconditioned. For operation by 60 to 70 h.p. tractor. Located Oklahoma. Box 2418

BUCYRUS-ERIE—10-B Trailer. Excellent condition. Favorable price. Located Connecticut. Box 2510

TRACKSON—CRAWLER WHEELS—Type 4C-W—15 ton. Only used for demonstration. Condition just like new. Attractive price. Located Milwaukee. Box 2387

ENTIRE PLANT of Walter S. Rae for sale at 237 Richard Street, Kingston, Pa. Write or call Main Office, 2534 Koppers Bldg., Phone Atlantic 0707, or Warehouse 237 Richard Street, Kingston, Pa., Phone King. 7-0513.

2—Linn Tractor Trucks, 9-yard hydraulic dump bodies; flaring side boards; down folding end gate. "28" models. Both Tractors completely overhauled. Box 2516

HEAVY-DUTY BOOM with point, sheave and shaft for 225 Bucyrus. Length 85 feet. Robinson Coal Co., Pleasanton, Kansas.

BUCYRUS-ERIE SCRAPER H-44. 2-wheel. 3½-yard capacity. Not factory reconditioned. Used very little—very good condition. Attractively priced. Located Indiana. Box 2528

SURPLUS MINE EQUIPMENT

BARGAIN PRICES

Write for prices of this equipment. Save money. Located in Minnesota.

1—Boiler, locomotive type, 150 H.P.
1—Motor, 135 H.P. squirrel cage, 1150 r.p.m., 220 v., 3 ph., 60 cy., A. C.; compensator.
3—Rotary converters, 300 Kw., HCC-6-300-1200, Forms P, D, & V, 6 and 3 phase.
1—Switchgear for 3-phase rotary converter, complete, semi-automatic.
3—Transformers, 300 Kw., 66,000 V. Primary, reconnected for 22,000 V. Primary.
1—Ainley placer gold machine, complete. 4-bowl with feed hopper for dragline operation. 40-50 tons per hour.
30—Hoists, single and double drum.
8—Pumps, steam (1 gas engine driven) from 40 to 3700 g.p.m.
1—Tractor, Twin City No. 12-20.
1—Water softener, 5 ft., complete.
Box 2503

Portable, 916 Cedar Rapids Gravel Plant, including power, receiving hopper and 23-yd. storage bin. Located Henry County, Ill. Collinson Bros., Moline, Ill.

USED EQUIPMENT

1—920 Cedar Rapids Jaw Crusher
1—⅞-Cu. Yd. Blaw-Knox Clamshell Bucket
1—1¼-Cu. Yd. Page Dragline
1—¾-Cu. Yd. Page Dragline
Centrifugal and Diaphragm Pumps
Box 2504

DRAG SHOVEL EQUIPMENT—For Bucyrus-Erie 1020 shovel. Located Rhode Island. Box 2332

BURCH UNLOADER — Motor driven. 4 wheel rubber tired trailer. Located Indiana. Box 2411

CONVEYOR EQUIPMENT. Approximately 3300 lineal feet used 36" conveyor equipment, consisting of Link Belt Type 40 troughing idlers, Link Belt Type 41 return idlers, 19 pairs head and tail pulleys, complete with motors, sprockets, silent chain drives, all bearings, etc. Excellent condition. Located Boise, Idaho. Reasonable price. Box 2498

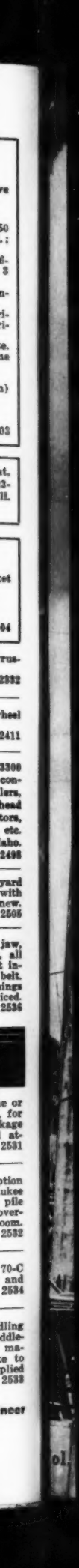
FOR SALE: 2 Austin Western Trail Cars, 6-yard water level, side dump bodies equipped with 2-way hydraulic side dump hoists. Nearly new. Located Colorado Springs, Colo. Box 2505

JEFFREY-BAKSTADT CRUSHER — 3 jaw, Single jaw primary, Two jaw secondary, all in one. Driven by 50 h.p. 3 phase 220 volt induction motor, including controls and belt. Approximate weight 27,000 lbs. New bushings and shaft recently installed. Reasonably priced. Located Western Pennsylvania. Box 2536

WANTED

Want a good used locomotive crane, gasoline or diesel powered, 45' boom, 20-ton capacity, for loading and unloading barges of package freight, crated machinery, etc. Clamshell attachment desirable. Box 2531

Want to rent 1-yard steam crane, with option to buy, if crane is located in Milwaukee vicinity. Prefer machine equipped for pile driving, to include: box-type 50' boom, oversize boiler, winch drum and high speed boom. Will consider gas powered model. Box 2532

Can use good 2½-yard used dipper for 70-C Bucyrus shovel. Advise condition, price and location. Box 2534

In the market for a good used dragline handling a 2-yard bucket. Perfect machine in middlewest, especially Illinois. Will consider machine with shovel attachment. Would like to deal on rental basis with rental to be applied on purchase price. Box 2533